

MARINE REVIEW.

VOL. VII.

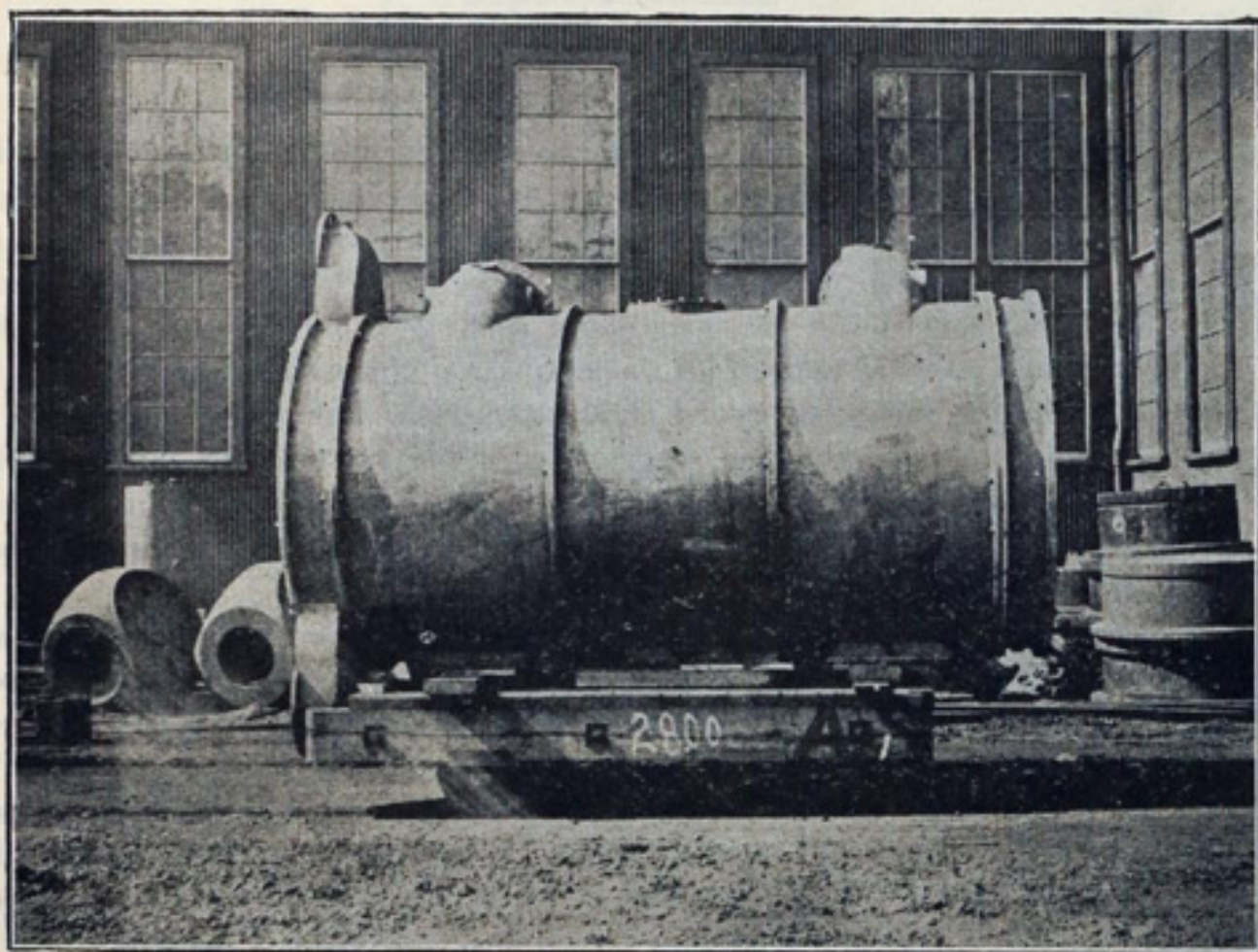
CLEVELAND, O., AND CHICAGO, ILL., JUNE 1, 1893.

No. 22.

Condensers of a Large Cruiser.

A. B. WILLITS, U. S. N.

In no more striking manner can be illustrated the great power developed by the machinery of a steamship of the largest and swiftest class, than by a statement of the quantity of water which is, during each minute, converted into steam, used expansively in the engines and again reduced to water in the con-



densers, and returned thence to the boilers. The fact of this endless repetition of its function of porter of heat and equivalent work, may be of quite common knowledge, but the *quantity* thus used is seldom referred to in print and is astonishing to even many of those who are familiar with steamers and machinery; while to the non-professional, the condensing feature is probably more novel and surprising than that of the original evaporation in the boilers.

It may be assumed that, broadly speaking, the modern marine engine will require about $17\frac{1}{2}$ pounds of water per horsepower, per hour, and when a ship of the type of the new United States cruiser Columbia is considered, where the horse power approaches 21,000, a simple calculation shows that the total quantity of water thus demanded amounts to more than 367,000 pounds per hour, or to put it more graphically, these engines will use, in the form of steam, about two and three-quarters tons of water each minute during which they are operating at full power. As it is most essential that there shall be practically no waste of this steam, and that every pound of it shall be condensed to its original form, after it has left the cylinders, the heat not converted into work therein, is sufficiently removed by the cooling surfaces of the condensers, hence mechanical provision for the efficient performance of this latter operation is a most important item in the general economy of the machinery, and a description of the apparatus designed for this purpose for the cruiser named is interesting.

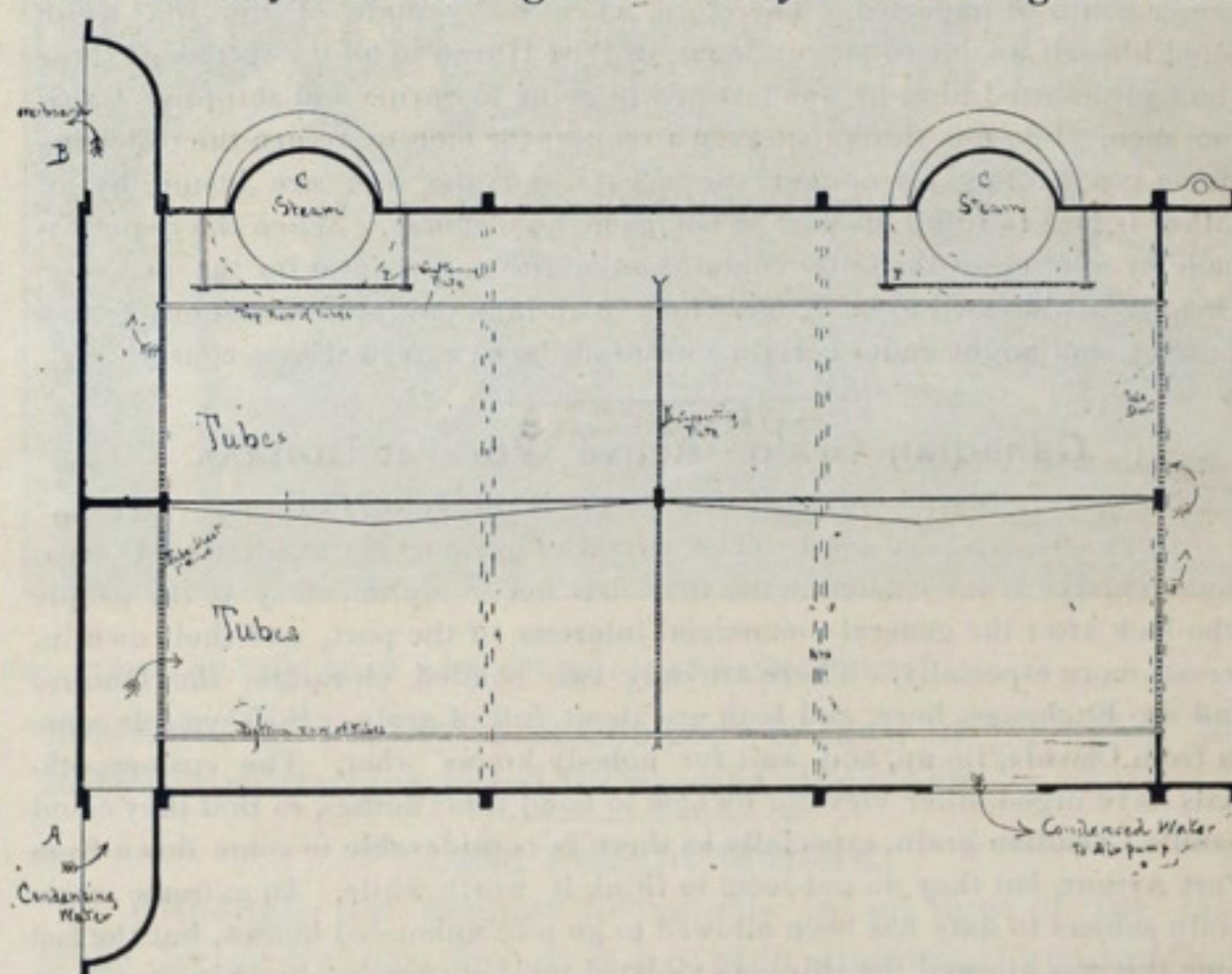
The engravings represent one of the three condensers of the Columbia. The material used in its construction is composition throughout, and its finished weight is about 27,000 pounds, or 12 tons. The length is 13 feet 8 inches, and the diameter of the shell is 6 feet 7 inches. The condensing water enters from the circulating pump at the nozzle A, and passing through the lower half of the tubes to the other end, returns through the upper

half and proceeds overboard by a pipe attached to the upper nozzle B. The steam from the exhaust pipes of the cylinders enters through the side nozzles C, and is scattered over the cool tubes, being by them condensed to water, and, falling to the bottom, it is drawn out by the air pumps, and eventually sent to the boilers.

There is, of course, a great range of temperature of the condensing water, both on account of the different seasons and by reason of the ship visiting tropical as well as arctic seas, and for this reason ample allowance of cooling surface must be given. In the case here illustrated, each condenser has 4,894 tubes of 12 feet length, and which, if placed end to end, will extend more than eleven miles. The cooling surface thus offered is 9,474 square feet. This aggregates for the three condensers more than thirty-three miles of tubes and about three-quarters of an acre of cooling surface.

Another point of interest is the vast quantity of cooling water which must be sent through the tubes to perform the condensing work. The estimates for this at average temperatures is about twenty-five times as much as the water to be condensed, and gives the enormous amount of seventy tons per minute, a stream of no insignificant proportions.

The importance of having a good and efficient condenser can not well be over-estimated. A good vacuum is essential to the production of the designed power, and many failures to reach this have been directly traceable to faulty design of this adjunct and its attached air pumps. The present proportions appear to give excellent results, but the field is open to the inventor for improving upon them and adding features calculated to increase its durability or to afford greater facility for cleaning and over-



hauling. The tubes themselves frequently give way or are destroyed by a galvanic action sometimes difficult to discover the source of, and, indeed, the subject is full of points well worth the study of designers.

In case an international conference should be held on the subject of a reform in the code of maritime signals, France will demand that a special meaning should attach to each letter of the code; also that two new flags should be added to the eighteen regulation ones, so as to raise the number of signal words from 30,000 to 120,000.

Alien Contract Labor Question.

WESTERN OFFICE, MARINE REVIEW,
No. 701 Phoenix Building, CHICAGO, ILL., May 31.

President Walter M. Grove and other leaders in the Seamen's Union claim to find something new in the latest ruling of the treasury department regarding the employment of Canadians as seamen on American vessels. Mr. Grove says that the ruling was just what the union has sought for several years, but vessel owners and others interested in the matter fail to see any change in the interpretation of the law by the treasury department.

Inspector Stitch thinks Inspector De Barry of Buffalo had exceeded the law in attempting to prevent Canadian sailors, who had sailed on American vessels during one season, from shipping on American boats the following season. "Unless a contract expressed or implied can be proven," said Mr. Stitch, "I know of no reason why a Canadian, or for that matter an alien of any other nationality, can not return to this country a second time and obtain employment in the same line of work as he had done previously. Congress has stipulated that all officers of American craft must be citizens of this country, yet it has not decided that the seamen must be citizens also, although it has that power. This is the opinion given to Superintendent Stump of this bureau, by Solicitor Reeves. I have often consulted with District Attorney Milchrist on this same matter, and this opinion agrees with his interpretation of the law. The term contract, as I understand it, is very broad, and takes in many things. If on the close of a season a master or vessel owner should ask his men to return at the opening of the next season, and they should do so, the alien labor law would be violated. If during the winter a master or owner should write to any Canadian seamen, who had sailed on his vessel the previous year, asking him to work for him the coming season, or to bring several more men with him, this would also be a contract, and the owner or master would be liable to prosecution. In the case of the schooner *Ida Keith*, Judge Bunn held that the vessel was in distress from want of men, as through the Seamen's Union no seamen could be found in Port Huron who would take the places of those discharged, and the master was therefore compelled to go to Sarnia to man his vessel. This, I think, was a broad interpretation of the law, and with the defense made in a different manner, the case would have been decided differently. But the action of Inspector De Barry in attempting to compel the Canadians to leave vessels in Buffalo is not warranted, and the captain of any craft that might be boarded for that purpose would be justified in retaining his men, and paying no attention to such orders. The proper course to pursue, in case evidence has been procured to show that the men were imported under contract, would have been to swear out a warrant and punish the persons concerned through the courts."

Charles H. Kremer, the marine lawyer, says of the *Ida Keith* case: "The master of an American vessel who finds himself in a foreign port short of men, from death, desertion or any other cause, is allowed to complete his crew with aliens, as it would not be practicable to hold the vessel there until American seamen could be imported. Therefore, when the captain of the *Ida Keith* found himself unable to procure men in Port Huron to fill the places of those who had deserted him, he was justified in going to Sarnia and shipping Canadian men. I do not think that even a request for men to return the following season is a contract, for neither the master nor the men are bound by it. Either is free to fulfill his part or not, as he may choose. When the request is made by a letter, or the letter contains an additional request for the person to whom it is addressed to bring more men with him, that approaches nearer to a contract, and might under certain conditions be so regarded by a court."

Canadian Grain—Active Work at Buffalo.

Special Correspondence to the MARINE REVIEW.

BUFFALO, N. Y., June 1.—The arrival of grain from Canadian ports occasions remarks at the custom house that are not complimentary to the people who look after the general commercial interests of the port, and their own interests more especially. There are only two bonded elevators, the Ontario and the Exchange, here, and both are about full of grain. Still vessels come in from Canada, tie up, and wait for nobody knows what. The customs officials have urged other elevator owners to bond their houses, so that they could handle Canadian grain, especially as there is considerable to come down from Port Arthur, but they do not seem to think it worth while. In extreme cases grain subject to duty has been allowed to go into unbonded houses, but the last time this was allowed the shippers violated their agreement to ship it out at once, and it is hardly likely they can obtain such a permit now.

There is complaint from various sources that Buffalo is charging more for handling ore than other ports, and the inference is that somebody who is native here is to blame about it. This may somehow be true, but it doesn't look that way. Most of our ore is handled by Ohio iron men. The oldest and best known dock is in the name of Pickands, Mather & Co. H. K. Wick & Co. of Youngstown probably handle the most of any one firm, and the new blast furnace is run by the Hannas of Cleveland. If they think we—or they—are charging more than they are warranted, compared with their Ohio charges, they can surely reduce the rates.

Buffalo has been a rushing port this season in spite of some bad business. In seven days we unloaded forty-four lumber barges of 24,000,000 feet of lumber, and gave the discarded union not a board to move, and at the same time we took

care of more grain than any other port in the world ever thought of handling. It is true that this port is not so fast, as regards grain and coal handling, as it used to be, but circumstances over which we have no control have done the mischief. Instead of there being any disposition to divert freight away from here on account of slow work, it appears that our former proportion is increased.

The extension of actual freight navigation down the Niagara to the vicinity of the Falls is an interesting undertaking in more than one sense. Till the excursion boats began to run down there two years ago, people imagined there was danger in going within a mile of the falls, but it was discovered that still water was the rule at that distance. Now the establishment of the old "Soo" paper company at the new tunnel with a monster plant under the name of the Niagara Paper Company makes it desirable to carry pulp wood down there, and this week tugs are engaged in making soundings down the west branch for the deepest water. This opens to traffic again the old Schlosser dock, long historic in connection with the early route west from Albany, which followed the Mohawk, Oneida lake, Oswego river, Lake Ontario, went overland from Lewiston to Schlosser and took to the water for the upper lakes at that point.

Naval Matters.

Special Correspondence to the MARINE REVIEW.

WASHINGTON, D. C., June 1.—Plans recently completed by the bureau of steam engineering of the navy department for the machinery of the torpedo boats to be carried by the armored vessels *Maine* and *Texas* continue to attract a great deal of attention. In the great aim to secure lightness of construction there are many novelties in the machinery, such as tubular shafts, wrought steel braces and perhaps most of all the adaptation of the frames and structural steel of the hull to the purposes of a rigid bed plate. The entire machinery, boilers, engines, pumps, shafting, etc., and with the boilers and tanks filled with water ready for instant service, weighs 12,000 pounds, and as the engines are to develop 200 horse power, this will make only 60 pounds of machinery for each horse power.

Secretary Herbert has decided to man the brick battle ship *Illinois*, now at the world's fair, with officers and sailors of the *Michigan*, now in Lake Michigan. The law provides that seamen to receive rations "must be aboard a seagoing vessel, attached to a receiving ship, or on duty at a navy yard." This prevents men being detached from vessels and ordered to the *Illinois* for steady duty. The men will remain attached to the *Michigan*, but will be sent to the *Illinois* daily for duty, returning to the *Michigan* to sleep and get their meals.

A model of the protected cruiser *Olympia*, being built by the Union Iron Works of San Francisco, was placed on exhibition at the navy department recently. The model is a beauty, and will be shipped to Chicago in a few days to become a part of the naval exhibit at the world's fair. The *Olympia* is a twin-screw protected cruiser of 5,800 tons displacement, and is to show a speed of 20 knots when completed.

Commodore Farquhar, chief of the bureau of yards and docks, has gone to the Pacific coast to inspect the new dry dock being built at Port Orchard, Washington, and the one at Mare Island. The former is well toward completion, and when finished will be one of the largest docks in the country. The bureau is now drawing up plans for another large dock at Algiers, La., for which Congress has made an appropriation. The Port Royal, S. C., dock will be the third built by the government in the last two years.

Commander George W. Coffin, formerly naval secretary to the light-house board, has passed a most successful examination for promotion to the grade of captain, and will be promoted at the first opportunity.

Official Numbers and Tonnage.

The bureau of navigation, E. C. O'Brien commissioner, assigned official numbers and tonnage to the following lake vessels during the week ending May 20: Steam—Orville A. Crandall, Buffalo, N. Y., 122.39 tons gross, 89.67 net, No. 155,239; Erastus Day, Buffalo, N. Y., 69.54 tons gross, 34.77 net, No. 136,360; Wm. Kennedy, Cleveland, O., 86.01 tons gross, 43.01 net, No. 81,435; Chris. Grover, Cleveland, O., 56.89 tons gross, 28.45 net, No. 126,955; Richmond, Chicago, Ill., 11.16 tons gross, 6.44 net, No. 111,029; Providence, Chicago, Ill., 11.16 tons gross, 6.44 net, No. 150,625.

The greatest depth under water ever reached by a diver is believed to have been attained by Captain John Christensen, who went down 196 feet below the surface at Elliot Bay, Wash., recently. He remained at that depth in his armor for twenty minutes, without inconvenience.

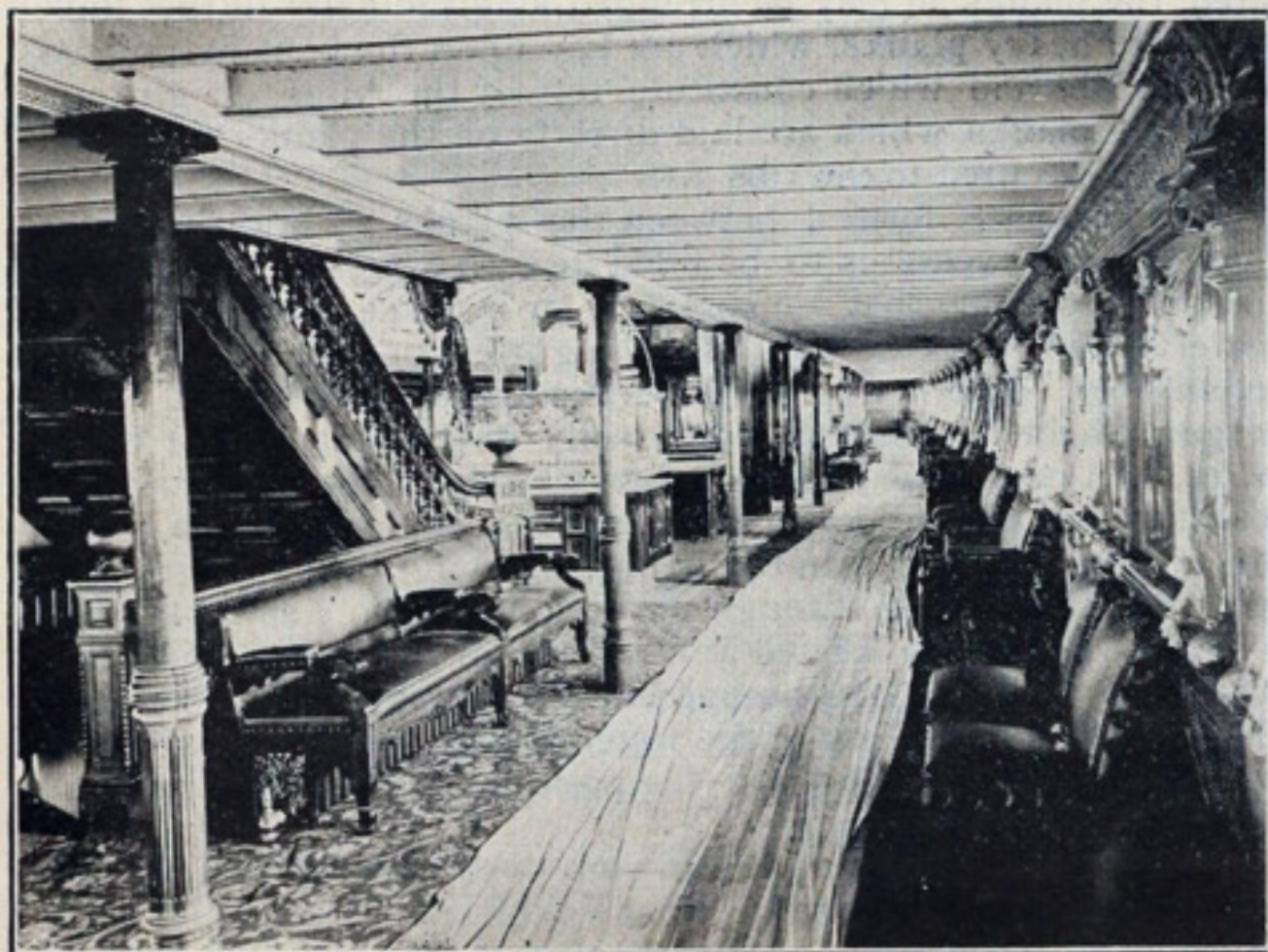
Detroit owners of the steamers *Palmer* and *Livingstone* are said to have been paid \$30,000 for releasing the world's fair company from its contract engaging the two boats for passenger traffic between Chicago and the fair grounds. Insufficient draft of water was the main reason for not making use of the *Palmer* and *Livingstone*.

No master trading to Lake Superior should be without a chart of the north shore. We have them for sale at \$1 each.

Lake Steamers Referred to as Tramps.

Mr. Harry J. Cornish of London, surveyor for Lloyd's Register, who made a trip around the lakes a short time ago, visited Philadelphia, Newport News, Chester, New York, Montreal, Vancouver, Victoria, New Westminster, Everett, Portland and San Francisco before returning to England. He reported upon his return to England that the only part of America where tramp steamers are being constructed is on the lakes, the work in all other yards being for lines of special trades. To this report Fairplay of London adds the comment that "the more recently built lake steamers are none too strong, and until Lloyd's

directions through the canal in 1892 was 1.31 mills, the Engineering and Mining Journal of New York says: "Assuming that the carriers made nothing, and that the cost was equal to the receipt, the amount stated, 1.31 mills, was just one-third of the cost per ton-mile reported by the Pennsylvania Company on its main line division last year, which is very near the lowest point ever reached in carrying railroad freight." This is a remarkable indication of the value of the lakes as a highway of commerce, but it is all the more wonderful when it is known that the lake carriers did make a fair profit, and the division among owners was certainly greater in proportion than that accorded the stock-



WORLD'S FAIR PASSENGER STEAMER CHRISTOPHER COLUMBUS—VIEWS OF THE BOAT AND INTERIOR ARRANGEMENTS.

Register is represented in that quarter it is only too likely that the vessels turned out may continue to be below the mark." Passing over the characteristic British egotism in the comment, it may be well to note that Mr. Cornish, as an excuse for his tour through this country, and in his anxiety to satisfy the managers of the register, who want to follow the Bureau Veritas to the lakes, had to make some sort of a sensational report urging the necessity of Lloyd's surveyors here. Other well known naval architects of England, notably John Millbank of the Salvage society, have not found occasion to class lake vessels with the ocean tramps.

One-Third of the Railway Cost.

Commenting on the report of Gen. O. M. Poe, engineer officer in charge of the St. Mary's Falls canal, which shows that the average rate per mile per ton on freight carried in both

holders of the Pennsylvania Company or any of the other big railway corporations, noted for watered stocks, etc.

Lake Freight Matters.

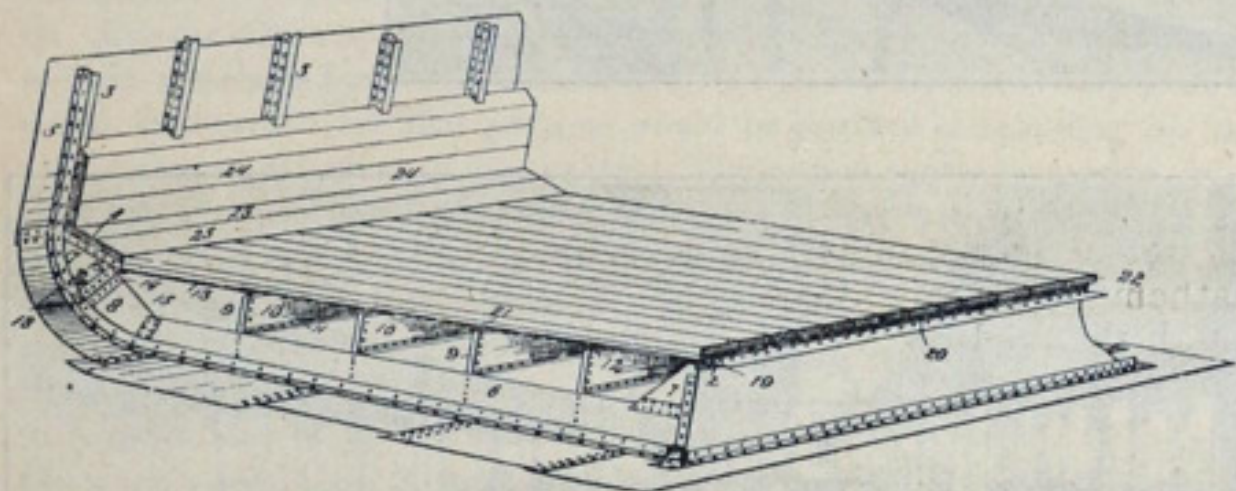
Although the demand for vessels in all lines of the lake trade during the past few days has been somewhat greater than the supply, the only advance of importance in freights is the establishment of a 65-cent rate from Escanaba. Efforts to advance both Chicago and Duluth grain freights have resulted in only a fractional increase being paid on a few cargoes. The freight situation is somewhat improved on the whole, however, and vessel owners find assurance of an active season in the immense quantities of freight being moved. Iron ore rates are 95 cents from Ashland, 85 cents from Marquette and 65 cents from Escanaba. Coal rates are unchanged but the movement is much larger than at any time since the opening of the season.

Capt. Alex. McDougall's Patents.*

COVERING FOR FALSE BOTTOMS OF VESSELS—SPECIFICATION
FORMING PART OF LETTERS PATENT NO. 480,823
DATED AUG. 16, 1892—APPLICATION FILED
SEPT. 17, 1891—SERIAL NO. 406,
014—NO MODEL.

"My present invention," says Capt. McDougall, "relates to new and useful improvements in an inner or false bottom of vessels, particularly those vessels invented by me and illustrated and described in several letters patent of the United States, such improvements being designed to effectively protect such inner or false bottoms from the action of heavy cargoes in being thrown thereon and at the same time to offer certain uninterrupted passages extending not only from side to side, but also before and aft, in order that any water which may have found its way onto said inner or false bottoms by leakage or otherwise may be conveyed off to the bilges or gutters at the side, and from thence to the well, from which it may be pumped, or directly to the well through the longitudinal passages. By means of my present invention I offer a very simple and effective covering for the inner or false bottoms of the vessel, which may be easily placed into position or taken up when worn; the weight of the cargo will be evenly distributed over the entire surface of the false bottom and not at certain points only, as is now the case, and there can be no possibility of coal dust or iron ore dust or other similar substances working into and clogging the bilges. The accompanying drawing is a perspective view of a portion of the bottom and frames of one of my improved vessels. Although my present invention does not relate, broadly, to the particular framework shown in the drawing it depends to a certain extent thereon.

"A brief explanation of this framework will be given. 1 is the keelson, provided with angle irons 2 2 at its top and bottom



on each side. 3 3 are the ribs of the vessel, which are made of two angle irons bolted together, so as to practically constitute a well known Z iron. The lower portion of each rib continues around on the line of the bottom of the vessel and is secured to one of the lower angle irons of the keelson. The upper portion of each rib is bent over to form a short angle piece 4, as shown. 5 5 are the outside plates of the vessel, which are riveted or bolted to each rib 3. 6 6 are a number of strengthening plates, which are bolted to the lower portion of each rib 3, and each one of which is provided with a separate swell-piece at one end, which fits up against the upper angle iron 2, before referred to, and with an inclined piece 8 at the other end, which is secured to the lower portion of each rib. 9 9 are short angle iron pieces, which are bolted to the plates 6 6 and which form supports for the plates 10 10, which extend the length of the vessel at right angles to the rib 3 3. The plates are further strengthened by means of small angle irons 11 at their lower ends. Each plate 10 is provided at its upper end with an angle iron 12, to which the metallic floor 13 is bolted. This floor constitutes the inner or false bottom of the vessel before referred to and is inclined slightly from the central part of the vessel down toward each side, and the space under it is known as the water-bottom of the vessel. This water bottom is adapted to be filled when it is desired, so as to constitute a water ballast for the vessel when light, and it also catches and retains all bilge water or leakage. Inclined plates 8 are provided at their upper end with an angle iron 14, to which the long plate 15 is bolted and which extends the entire length of the main portion of the vessel. It will be seen that there will be formed a trough-shaped passage way between this plate 15 and the outer plating of the vessel, which I have called "bilge" or "gutters." 16 16 are a number of angle irons bolted on top of the plates 15 directly over the angle irons 14, and 17 is

a gusset plate between the upper portion 4 of the rib and the angle iron 16. Each gusset plate 17 is provided with a hole or passage therein to allow the water to work from one end of the vessel to the other. If the false bottom 13 were left unprotected it would soon become injured by the falling of heavy cargoes, such as coal and iron ore thereon and would no longer be air tight, so that if the vessel should spring a leak in her bottom the false bottom 13 would not keep the vessel afloat, but would allow the water to enter the main portion of the hull. Heretofore these false bottoms have been provided with an inner covering of wooden planks, which have been laid upon blocks or angle irons or Z-irons placed three or four feet apart. Such a construction was not only expensive, but the weight of the cargo rested entirely upon these supports and tended to weaken the false bottom at these points.

"In my present invention I take a number of planks 19 19, which are laid on the false bottom 13 and extend from one side of the vessel to the other. These planks are to be made of some soft wood—such as pine—which will readily give to any unevenness in the floor and to the rivet heads thereon, and these planks 19 should be placed about two inches apart and parallel with each other, so as to form passages 20 20 between them. The planks 19 are provided with one or more breaks 21 therein, which offer a passage way fore and aft for the water. On top of the planks 19 are laid other planks 22, which are made of heavy wood, such as oak, in order to better withstand the impact of any hard substances which may fall thereon. The joints between the planks 22 occur directly over the planks 19. The planks 22 are laid close together so as to constitute a solid floor, and, if need be may be nailed or otherwise secured to the plank 20, although this is not absolutely necessary. If need be, two layers of planks 19 may be used with passages between them so arranged that the passages between the upper layer will occur in alternation with the passages of the lower layer and, indeed, three or more layers of planks 19 may be used to increase the drainage. In all instances, however, the top floor 22 is to be used. It is preferable to lay this top floor from one side of the vessel to the other so that there can be no leakage into the main portion of the hull, but, if desired, the planks 22 may be arranged longitudinally in the hull. 23 23 are heavy planks, which are laid upon the bent in portion 4 of the ribs and which constitute top for the bilge or gutters. 24 24 are planks which are laid directly on the planks 23 23 and which are secured to the ribs 3.

"The space formed between the planks 24 and the outer plating of the vessel is to be filled in with cement or some similar substance, so that no coal dust or iron ore dust or similar material can work its way into the gutters or bilges. By this manner of constructing false bottom vessels the weight of the cargo will be distributed very evenly thereon at almost every point. In case water should find its way above the floor 22 it will leak through the same and will flow down the passages 20, which are inclined slightly into the gutters or bilges at the sides and from thence will pass through the openings 18 to a suitable well, which is generally located at the stern of the vessel, and from which the water may be pumped in any suitable way. In case there is a leakage in top of the water bottom, the water will flow in the same manner through the passages to the bilges and will be removed by the pumps.

"What I claim as new is an improved false bottom for vessels, consisting of a metallic floor 13, bilges or gutters on each side thereof, strengthening gusset plates 17, perforated and arranged as described, planks 19 19, laid on said floor 13, having passages 20 20 between them, and breaks 21 extending fore and aft, planks 23 23 extending over said bilges or gutters, planks 24 above said planks 23 and secured to the ribs of the vessel, and cement or similar material between said planks 24 and the outer plates of the vessel, substantially as described."

The New York Shipbuilding and Engine Company is a new corporation which has purchased ground at Whitestone, L. I., and will erect a large plant to build small steam vessels, chiefly high speed yachts. They are also prepared to do repair work of all classes. The firm embraces names well known in this line of business. Edwin A. Stevens, president of the Hoboken Ferry Company, is the president of the new concern; Irving Cox, naval architect, is vice president, and Townsend Cox is secretary and treasurer. The capital is \$500,000 in \$100 shares. The directors are J. R. Roach, George Weed, William Rowland and Jas. F. Cox, and the company has acquired all the patents owned by C. D. Mosher, who is to be the superintending engineer.—The Engineer, New York.

*Under this heading we will publish specifications accompanying letters patent granted to Alexander McDougall since his first application for a patent on the whale-back type of vessel May 1, 1880.

Booming a Canadian Steamboat Company.

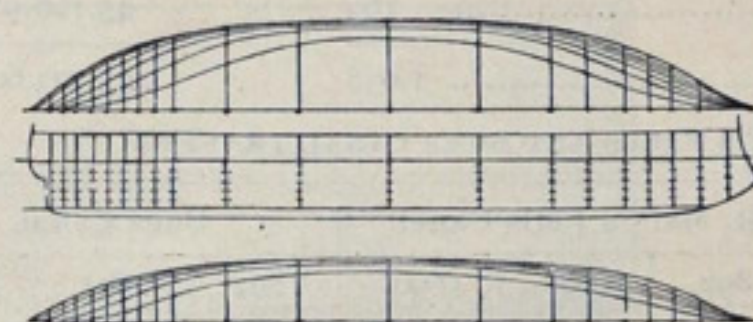
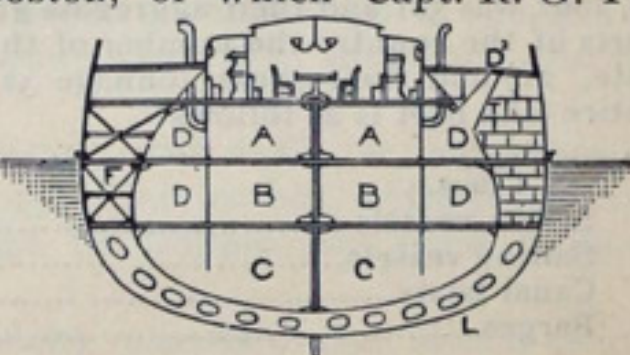
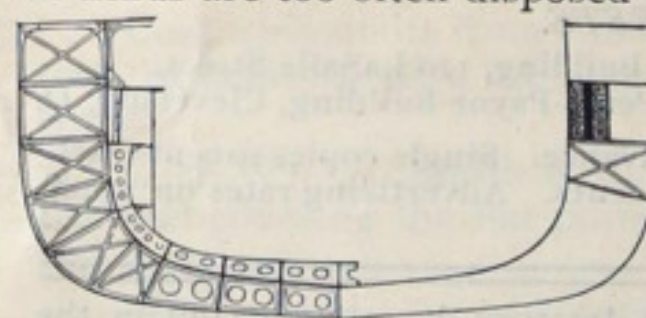
An effort is being made in Toronto to form a company for the establishment of a new line of passenger steamers on the Lake Ontario-St. Lawrence route, and the promoters are going about it in the regular English style. A prospectus from Francis R. Boselly of 20 King street, east, Toronto, offering shares in the enterprise, announces that the company will be known as the International Navigation Company, Limited, to be incorporated under the provisions of the joint stock companies' letters patent act, Canada; capital \$1,000,000, in 10,000 shares of \$100 each. The following gentlemen have consented to act as provisional directors: Hon. George C. McKindsey, senator, Toronto; Alexander Manning, esquire, Toronto; Col. E. Blos Parsons, director Northern Central Railroad, N. Y.; Cornelius Van Cotte, postmaster, New York City; Chaales S. Upton, president Rochester Lamp Company, New York; Solomon Sylvester, Sylvester Bros., wharfingers, Toronto; James T. Mathews, vessel owner, Toronto; Warren Tobey, leather merchant, Collingwood; Alexander E. Wallace, manager Atlas Loan Company, Toronto. The solicitors are Blake, Lash & Cassels of Toronto, and the Canadian Bank of Commerce is also mentioned in connection with the project. Options have been secured, it is claimed, on several comparatively new boats, and it is proposed to build two steamers specially suited to the service.

The prospectus says: "The history of well managed steamboat companies has been almost universally a record of success. An almost identical enterprise is the Detroit & Cleveland Steam Navigation Company, which operates between the cities of Detroit and Cleveland, similarly situated as Toronto and Rochester. They have made since 1850 on an investment of \$44,500, the enormous sum of \$1,100,000, after paying large dividends. A single steamer from Charlotte has, by making hourly trips, carried 10,000 people at 25 cent each in a day. This same steamer on the Charlotte and Alexander Bay route earned according to statement of her master \$62,000 net in three years. The fast time which will be made by these large new steamers, their steadiness in all weathers, the regularity and safety with which they will make their trips, can not fail to attract a large share of local business travel from Toronto, Hamilton, London and other Canadian cities. This line will undoubtedly be a dividend payer from the start. The promoters are to transfer to the company, when organized, all options and contracts on boats, and all contracts and arrangements with railways; they are to pay all expenses of organizing and floating the company, and in consideration thereof, they are to receive in paid up stock 10 per cent. of the capital bona fide subscribed. No cash is to be paid to them, they being willing to show their confidence in the enterprise, by taking their remuneration in a way which would have given them nothing if it had not been successful. Stock subscriptions will be called as follows: Ten per cent. on subscription, 10 per cent. on allotment and the balance as it may be called by the board of directors, according to the requirements of the company. This company will be conservatively, carefully and honestly managed; it will be a business man's line as well as a tourist's. The strong railroad connections already secured, with superior accomodation and attention to the wants of the travelling public, will surely produce large earnings."

It seems strange to refer to W. K. Vanderbilt's Valient, recently launched at Birkenhead, near Liverpool, as a yacht, and yet the term is good as long as the vessel is to be used for pleasure purposes. This boat, which is to replace the sunken Alva, is a steel twin-screw steamer of 2,400 tons. The principal dimensions are: Length between perpendiculars, 310 feet; beam, 39 feet; depth, 25 feet 6 inches. She will have two sets of triple expansion engines driving manganese bronze screws. The horse power to be developed will be 4,500, which will insure with moderate forced draft a speed of 17 knots, while under natural draft the vessel will steam 15 knots.

Another Type of Unsinkable Ship.

Inventors of new types of vessels and marine appliances of all kinds are too often disposed to disregard the important item of first cost in their efforts to work out improvements on old methods. A system of constructing passenger steamers, men-of-war and other vessels, which is presented by Capt. Geo. Meacom of 278 Chestnut street, Chelsea, Mass., seems to involve this disadvantage to a remarkable degree, but the designs are nevertheless interesting. A corporation known as the Columbia Safety Steamship Company of No. 7 Doane street, Boston, of which Capt. R. G. F. Candage of the Bureau Veritas is treasurer, has been formed for the purpose of developing Mr. Meacom's plans and constructing steamships according to the same. The company affirms that the present method of bulkheading ships for safety, fore and aft and transverse throughout the body of the ship, does not accomplish the result hoped for, and to remedy the possibility of ships foundering at sea in the event of disaster, even though the whole interior of the ship was so full of water that it would be level fore and aft with the sea on the outside, is the purpose of the new design. Capt. Meacom's method consists in bulkheading the wings of the ship off into scientifically arranged



compartments fore and aft, with transverse bulkheads worked in at proper intervals, the whole in combination with a double hull, a mathematically calculated space, the buoyant power of which, through the medium of hermetically sealed air tanks can float the ship, cargo, passengers, and all on board, under any and all circumstances. Throughout compartments are built, and between the double hulls regular decks are laid with appropriate flush hatchways, through which the air tanks 4x4x8 feet will be lowered to position, and from which they can be hoisted at any time for inspection, and if the owners should decide at any time to put the ship on as a general freighter, the tanks can be left on shore, thus leaving the compartments or holds for general cargo room. Without the air tanks in the compartments, the ship is no safer or better than ships extant, and would go to the bottom just as quickly. The plans shown herewith represent a vessel similar to the United States steamer Maine, a ship of about 8,000 tons register.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on May 27, 1893:

	Wheat, bu.	Corn, bu.
Chicago.....	20,457,000	1,280,000
Duluth.....	11,743,000	.....
Milwaukee.....	1,400,000	9,000
Detroit.....	1,325,000	13,000
Toledo.....	2,516,000	150,000
Buffalo.....	4,624,000	493,000
Total.....	42,064,000	1,945,000

At the points named there is a net increase for the week of 431,000 bushels of wheat and a decrease of 331,000 bushels of corn.

Additional copies of the lithograph supplement of one of the new Northern line passenger ships which appeared in a recent issue of REVIEW will be sent to any address for 40 cents each. In mailing the picture a tube will be used to protect it from injury.

MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Chicago Office, Western Union Building, 110 LaSalle Street.
Published every Thursday at No. 516 Perry-Payne Building, Cleveland, O.

SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each.
Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department contain the names of 3,657 vessels, of 1,183,582.55 gross tons register in the lake trade. The lakes have more steam vessels of 1,000 to 2,500 tons than the combined ownership of this class of vessels in all other sections of the country. The number of steam vessels of 1,000 to 2,500 tons on the lakes on June 30, 1892, was 321 and their aggregate gross tonnage 534,490.27; in all other parts of the country the number of this class of vessels was, on the same date, 217 and their gross tonnage 321,784.6. The classification of the entire lake fleet is as follows:

Class.	Number.	Gross Tonnage.
Steam vessels	1,631	763,063.32
Sailing vessels.....	1,226	319,617.61
Canal boats.....	731	75,580.50
Barges.....	69	25,321.12
Total.....	3,657	1,183,582.55

Tonnage built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
1888.....	222	101,102.87
1889.....	225	107,080.30
1890.....	218	108,515.00
1891.....	204	111,856.45
1892.....	169	45,168.98
Total.....	1,038	473,723.60

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

	St. Mary's Falls Canal.			Suez Canal.		
	1892.	1891.	1890.	1892.	1891.	1890.
No. vessel passages	12,580	10,191	10,557	3,559	4,207	3,389
Ton'ge, net regist'd	10,647,203	8,400,685	8,454,435	7,712,028	8,698,777	6,899,014
Days of navigation.	223	225	228	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

ALTHOUGH the vessel owners who agreed to bear a part of the expense of publishing the Inland Lloyd's Register this season were given to understand that there would be a thorough inspection and classification of all steel boats for the register, no information regarding these vessels has as yet been published. It is probable, however, that the general agents are informed regarding the structural qualities of the different steel vessels, as Capt. Herriman, who was employed by the underwriters to inspect them, is still at work, and it is not at all likely that he is being paid a large salary without making reports on all such vessels. Unless indications are misleading, there will be no register published next year, as the general agents are having trouble in collecting the inspection fees from vessel owners, and by the publication of the register, which involves quite an expense, they are giving information to foreign underwriters who are taking a large part of the lake business. The troubles of the general agents seem to increase as competition grows stronger. A private inspection will probably be tried if publication of the register is dropped.

VESSEL owners, as well as Canadian seamen who seek employment on lake vessels of the United States, can rest assured that there is nothing new in the dispatches from Washington relative to the employment of alien seamen. J. R. DeBarry, an immigrant inspector of Buffalo, has been parading his own private views on the laws pertaining to the subject, and this is all that there is to the present agitation. All well informed vessel owners and masters are aware that officers of vessels of the United States must be citizens, but other help on the vessels may come from any section of the globe. It is to be remembered, however, that aliens can not be brought into the service under any form of contract that might be construed as a violation of the contract labor law. The services of Canadian seamen must

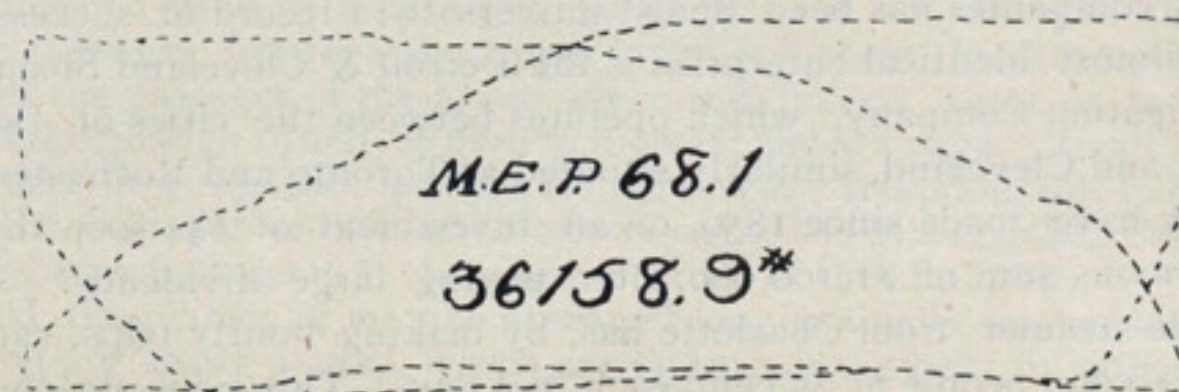
not be solicited, even to the extent of asking any of the members of a crew to return in the spring when a vessel has been laid up at the close of the season, but the services of aliens for all positions excepting officers can be accepted without hesitancy when offered in a port of the United States.

It is again announced that both Canada and the United States are ready to clinch the matter of reciprocity of wrecking in waters contiguous to the two countries. The announcement has been made so often that representatives of the important interests involved are still skeptical of sincerity on this question. There is no excuse for the great delay already suffered, and the Washington authorities should immediately proceed to give wide and plain information on the subject, if it has finally been settled.

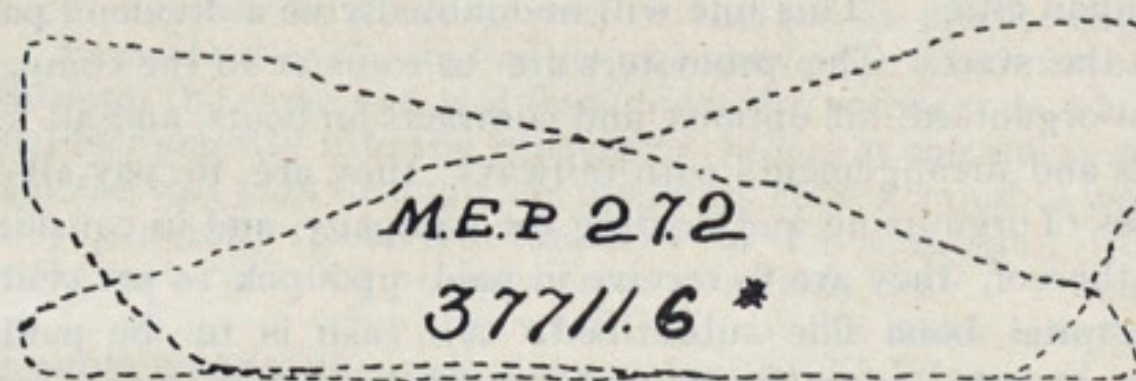
Cards From the Engines of the Columbus.

Reference was made in last week's issue to very favorable results obtained in a trial of speed made with the big whaleback passenger steamer Christopher Columbus during the trip between the West superior ship yard of the American Steel Barge Company and Chicago. The cards here shown were taken during a short run on Lake Michigan. It is confidently expected that the engines will develop 3,000 horse power.

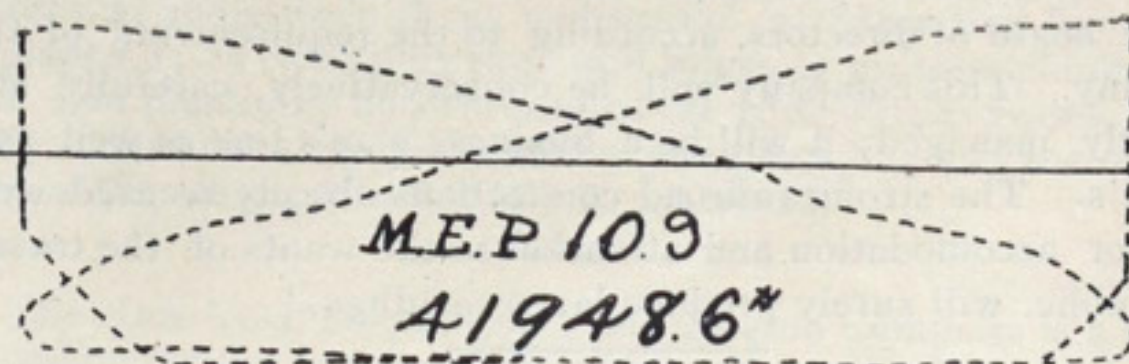
SPRING 80



SPRING 40



SPRING 16



Steamer—World's fair whaleback passenger boat, built by American Steel Barge Company of Superior, Wis.; engined by S. F. Hodge & Co. of Detroit, Mich.

Cylinders—26, 42 and 70 inches by 42 inches stroke.

I. H. P., high pressure	828.3
" " " intermediate.....	863.9
" " " low pressure.....	945.4

Total..... 2,637.6

Steam, 155 pounds; vacuum, 25 inches; revolutions, 108.

Iron Mining.

VALUE OF LEADING STOCKS.

Quoted by Chas. H. Potter & Co., No. 104 Superior St. Cleveland, O.

Stocks.	Par Value.	Bid.	Asked.
Cleveland-Cliffs Iron Company.....	\$100 00	\$.....	\$.....
Champion Iron Company.....	25 00	27 00	.....
Chandler Iron Company.....	25 00	.....	40 00
Jackson Iron Company.....	25 00	.....	75 00
Lake Superior Iron Company.....	25 00	26 00	.....
Minnesota Iron Company.....	100 00	.....	61 00
Pittsburgh & Lake Angeline Iron Co....	25 00	.....	140 00
Republic Iron Company.....	25 00	.....	9 50
Ashland	25 00	.....	.....
Section Thirty-three.....	25 00	1 00	.....
Brotherton.....	25 00	2 00	2 50
Iron Belt.....	25 00	2 40	2 75
Aurora.....	25 00	6 50	7 00

The differences that have arisen between the Standard Ore Company and the Cincinnati Iron Company are indicative of a general movement to reduce royalties and otherwise bring the properties of the new Missabe range to a basis upon which they can be worked so as to meet the general reduction in the value of ore. The middle-men, or the corporations acting between fee holders and mining companies, must go, in order to secure success with some of these properties.

Assay cards attached to the exhibit of Minnesota mines at the World's Columbian Exposition make some high claims for

Around the Lakes.

Receipts of coal at Milwaukee up to June 1 were 226,426 net tons, of which 85,432 tons were bituminous.

Coal shipments from Buffalo last week aggregated 114,245 tons, or nearly double the amount moved during the previous week.

L. P. & J. A. Smith of Cleveland have begun work on their contract covering the Bar point section of the 20-foot channel improvement.

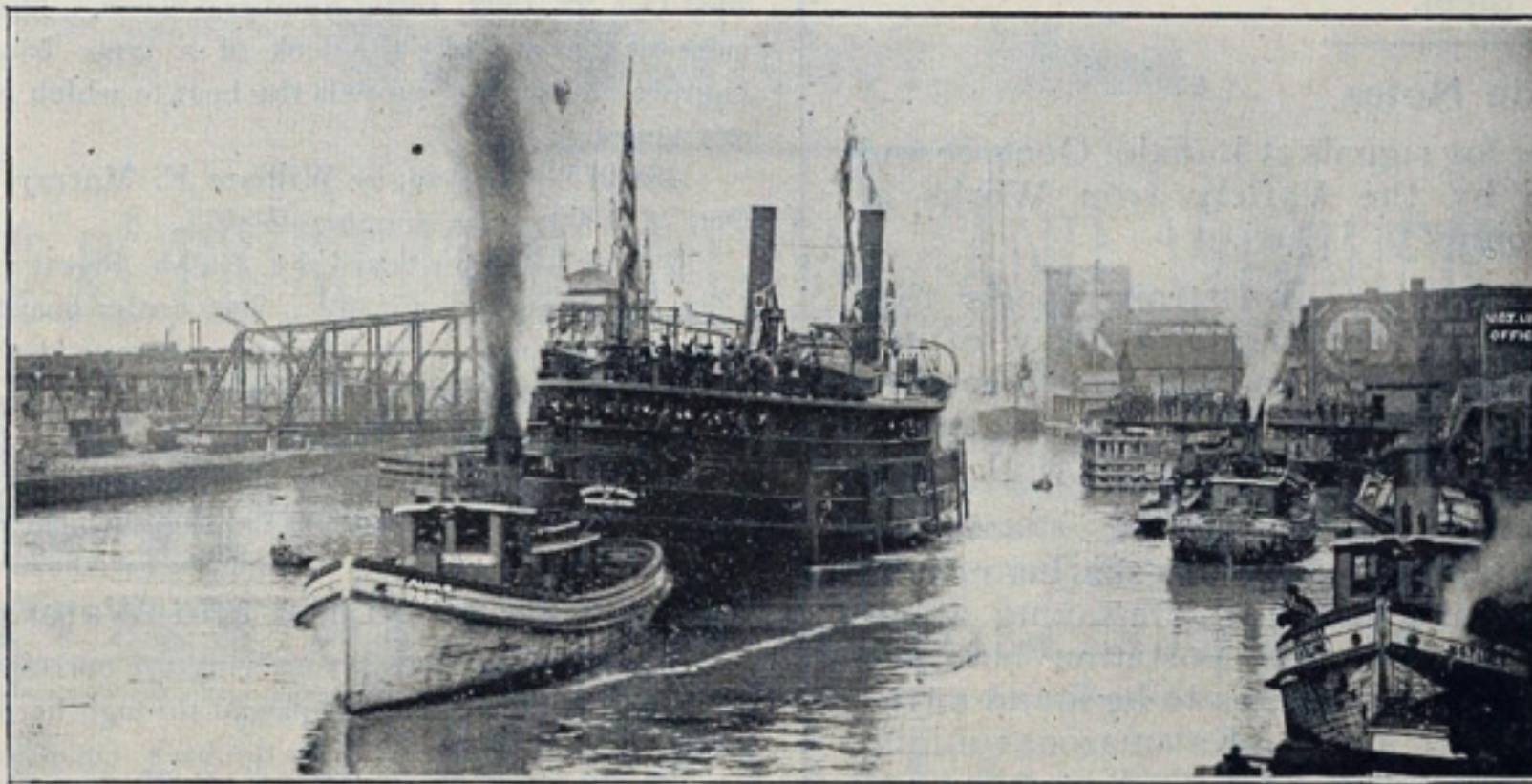
Wilson line steamer Yuma of Cleveland has just delivered at Huron, on a draft of 14 feet 3 inches, a cargo of 2,958 gross tons of ore from Lake Superior.

Capt. Herriman, the representative of the Bureau Veritas on the lakes, and Supervising Inspector McMasters of the steamboat inspection service were among visitors in Cleveland during the week.

Cargo underwriters of Chicago are again at loggerheads. The Insurance Company of North America has withdrawn from the board, and the rate on grain to Buffalo has been reduced from 50 to 30 cents per \$100.

Phillip Minch, manager of the vessels of the Minch estate, Cleveland, received from Lake Superior a few days ago the starboard lamp of the lost steamer Western Reserve. The lamp drifted ashore attached to the screen and was in perfect condition.

The steel steamer Sam Mitchell last week made the run from Buffalo to Duluth entry in 72 hours. Her time from the "Soo"



A CUYAHOGA RIVER SCENE.

Missabe ores. The following table includes most of the analyses which are, of course, from picked samples:

	Iron.	Phos- phorus	Silica.	Manga- nese.	Comb. water.
Lake Superior Iron Company—Location, section 31, town 58, 20.....	66.10	0.025	4.07	0.41	.....
Missabe Chief Iron Company—Section 23, 57, 22.....	66.58	0.016	2.83	0.61	.....
Adams Mining Company—Section 31, 58, 17	65.40	0.031	1.61	0.88	4.28
Same mine	66.80	0.023	1.24	0.48	2.35
Lone Jack Iron Company—Section 9, 58, 17	64.39	0.043	3.91	0.33	3.45
Roncheleau-Ray Iron Company—Section 9, 58, 17.....	66.43	0.037	2.45	0.69	1.10
Same company—Section 17, 58, 17.....	67.10	0.017	2.18	0.22	0.87
Iron King Mining Company—Section 20, 58, 17.....	66.50	0.031	1.95	0.46	1.86
Biwabie Iron Company—Section 16, 58, 17..	68.21	0.030	1.35	0.25	.....
Same company—Section 3, 58, 16.....	67.60	0.013	1.85	0.13	1.10
Commodore Iron Company—Section 9, 58, 17	65.50	0.007	2.31	0.56	1.61
Wyoming Iron Company—Section 9, 58, 17..	64.70	0.036	3.45	0.29	2.70
Bessemer Iron Company—Section 9, 58, 17..	64.68	0.032	4.80	0.43	1.81
Cincinnati Iron Company—Section 3, 58, 16	65.60	0.021	3.40	0.32	2.83
Mountain Iron Company—Section 3, 58, 18..	68.20	0.018	1.20	0.61	0.81
McKinley Iron Company—Section 8, 58, 16	64.70	0.014	5.98	0.13	0.68
Same mine.....	65.75	0.009	4.63	0.11	0.48

Capt. Alexander Nicholson, aged eighty-two years, died in Grand Rapids, Mich., a few days ago, at the home of his son, Capt. William Nicholson of the Goodrich line steamer Atlanta. He was a veteran in lake service, and two of his sons other than Capt. William Nicholson are in charge of lake vessels.

lock was 25 hours 42 minutes. She arrived in Duluth Saturday evening, and at 2 P. M. Sunday got out of port with 86,500 bushels of corn

Engines for the whaleback steamer Everett, building at Everett, the new barge town on Puget sound, will soon be shipped from the Frontier Iron Works, Detroit. Ten cars will be required in moving the machinery to the Pacific coast. The engines are duplicates of those built by the same company for the whaleback Pathfinder, but are, of course, provided with a surface condenser. The cylinders are 24, 38 and 64 inches diameter by 42 inches stroke of piston. Four boilers for the same vessel are being built by Wickes Bros. of Saginaw. They are 11 by 11 feet and will be allowed 160 pounds of steam.

One of the finest freight vessels to go into commission this season is the Western Transit Company's steamer Mohawk, launched last week at the Wyandotte yard of the Detroit Dry Dock Company and now about ready to receive her machinery at the Dry Dock Engine Works, Detroit. This boat is built after the style of the successful package freight steamers Harlem and Hudson but is a much larger vessel. She is 310 feet over all, 42 feet beam and 24 feet deep, and will have capacity for about 2,300 gross tons of freight. The engines are of the triple expansion type, with cylinders 27, 37 and 62 inches by 48-inch stroke. The boilers, two in number, are 11½ feet in diameter and 18 feet in length and will be allowed 165 pounds of steam. In the construction of the Mohawk, as in all metal vessels built by the Detroit Dry Dock Company, all the plates are of open hearth steel, and every piece is tested by the company's expert before it leaves the mill. This steamer is built at a cost of about \$225,000.

In General.

In France a movement has been started to compel vessels to carry oil and the necessary apparatus for distributing it in heavy seas.

The Paris at one time had 750 first and second-class passengers, and 450 steerage; the total passage money received was \$67,500. —Engineer.

Some idea of the cost of running the cruiser Baltimore, ordered to China, may be obtained from the report of her cruise last year, which amounted to \$307,700, including \$43,000 for coal.

A new air pump for marine engines, designed by Past Assistant Engineer F. H. Bailey, U. S. N., has been tried at the Portsmouth navy yard with good results. At speeds running as high as a thousand revolutions per minute, the pump, it is claimed, worked well and maintained a vacuum of fair value.

Capt. McDougall is a bull on the freight market this season. He proclaims confidence in going rates as against season contracts. If he had taken a large amount of northwestern grain at the profitable rates offered during the early spring, or if the entire capacity of the whaleback fleet, instead of about 25 per cent. of it, was tied up to ore contracts, he might be expected to show little interest in "wild" freights. But his judgement was against taking much of the wheat, and the contract rates on ore, when they were established, were so low as to warrant anyone in refusing to tie up to too much of it. The captain's judgment has been good in a great many ways, however, and his associates in the vessel business, who are also taking chances on going rates, are pleased to have him with them.

Trade Notes.

Boilers and machinery for fog signals at Buffalo, Genesee and Ashtabula will be furnished by the Variety Iron Works of Cleveland. The contract amounts to \$4,300.

The Penberthy Injector Company of Detroit reports that they again have their machinery in motion after a delay of ten days occasioned by a fire at their factory on May 9. Over fifty carpenters, masons, plumbers, roofers and steam fitters have put in shape in seven days what looked to be a month's work after the fire. They are prepared to fill orders as usual.

Thos. Drein & Son, Wilmington, Del., invite marine men to visit their exhibit of life boats, rafts and other life-saving appliances at the world's fair, section D 1, transportation building. In addition to this exhibit, their appliances are to be found on the Christopher Columbus, Arthur Orr and the Kalamazoo, running between Chicago and the fair grounds. The Au Revoir, owned by Mr. Dupont, and the Astor yacht Normabal, which will make the trip from the coast to the fair, will give owners of lake steam yachts an opportunity to see how eastern yachts are fitted. Both of these yachts were furnished out-fits by Thos. Drein & Son.

The Continental Iron Works of Brooklyn, N. Y., has a contract for over four hundred corrugated steel furnaces for the boilers of the new American line steamers, now being built at the William Cramp & Son's Ship and Engine Building Company's works, Philadelphia. In addition to this contract the Cramps have given an order to the Continental Iron Works for over a hundred corrugated steel furnaces for the new cruisers for the United States navy now under construction at their works, beside the furnaces for a steam yacht for which they have guaranteed great speed. The welded steel steam pipes for the triple screw United States cruisers Minneapolis and Columbia, the latter better known as the Pirate, are to be furnished by the same works.

The steamers of the Western Transit Company's Lake Superior line will be officered this season as follows: Arabia, Capt. R. Murray, Purser Robert Murray, Steward M. M. Dowling; Badger State, Capt. James Kennedy, Purser G. C. Carscadin, Steward C. A. Dickson; Empire State, Capt. John Cassin, Purser F. W. Servoss, Steward J. M. McCloig; Idaho, Capt. G. W. Bryce, Purser W. W. Gleason, Steward C. H. McBean; Montana, Capt. S. R. Jones, Purser S. R. Jones, Steward J. V. Lee; Vanderbilt, Capt. N. McCormick, Purser N. McCormick, Steward Jas. Derling; W. H. Gilbert, Capt. G. A. Minor, Purser G. A. Minor, Steward A. Ellis; W. H. Gratwick, Capt. M. P. Parsons, Purser M. P. Parsons, Steward Jas. Robertson.

British charts of Lake Superior cover the entire north shore. We have them for sale at \$1.

Record of Speed and Big Cargoes.

[Masters or owners of freight boats are invited to report improvements on this list.]

Iron ore: Maritana, Minnesota Steamship Company of Cleveland, 4,260 gross or 4,771 net tons, Escanaba to South Chicago; Maryland, Inter-Ocean Transportation Company of Milwaukee, 3,663 gross or 4,103 net tons, Escanaba to South Chicago, draft 17 feet 4 inches.

Grain: Selwyn Eddy, Eddy Transportation Company of Bay City, 139,820 bushels of wheat, Detroit to Buffalo; E. C. Pope, Eddy Transportation Company of Bay City, 125,730 bushels of corn, Chicago to Buffalo; Onoko, Minch estate, Cleveland, 187,657 bushels of oats, Chicago to Buffalo.

Coal: E. C. Pope, Eddy Bros. of Bay City, 3,950 net tons anthracite, Buffalo to Chicago.

Speed: Owego, Union Line of Buffalo, Buffalo to Chicago, 889 miles, 54 hours and 16 minutes, 16.4 miles an hour.

Invention of a Marine Nature.

Specially reported from the patent office Washington for the MARINE REVIEW.

497,325—Vessel for shallow water navigation, by Charles G. Kellogg of Wyoming, N. J.; filed March 30, 1892; serial number, 426,999. The wheel is placed in the bow and is provided with curved vanes, which in their revolution tend to raise the boat out of the water or to buoy it.

497,375—Life raft, by George B. Hussey of Providence, R. I.; filed June 23, 1892; serial number, 437,713.

497,706—Steering gear for vessels, by Ralph H. Case and John J. Daley of Jacksonville, Fla.; filed Oct. 14, 1892; serial number, 448,900. The rudder head is provided with a disc to which flexible connections are attached and then passed about pulleys. The latter are attached to a carriage which is moved by a power actuated piston.

498,036—Ship locomotive, by Henry DeM. Snell of London, England; filed Oct. 22, 1892; serial number 449,689. The device is in the form of two caissons that straddle the deck of a large barge, and being provided with engines and screws, propels the boat to which it is attached. It will go upon any vessel.

498,075—Capstan, by William F. Murray of San Francisco, Cal.; filed Oct. 26, 1892; serial number 450,077.

498,082—Center board, by Ralph Pigott of Straits, N. C.; filed Nov. 5, 1892; serial number 451,091. Two center board wells are so placed that the boards open towards the bow and converge in the rear.

498,160—Electric steering gear, by Frank L. Dyer of Washington, D. C.; filed April 18, 1891; serial number 389,521.

Copies of patents can be had from the MARINE REVIEW, No. 516 Perry-Payne building, Cleveland, O., at the uniform rate of 15 cents each.

Land and Water Ship.

The following is from our Kingston correspondent:

"A peculiar kind of tug passed through here recently for the lakes adjacent to the Bonne Chene river in the back country. It is called an alligator tug, because it is able to travel upon land as well as in the water. The boat was turned out of the shops of West & Peachey, Sincoc, and is patented by the firm in Canada and the United States. It has proved a great success in the lumbering business. The firm has completed six of them. They are 37 feet long and 10 feet beam and decked all over. They are built scow-shaped with steel shod runners for working portages. In water the boat is propelled at the rate of six miles an hour, either forward or backward, by an engine of 22 horse power. On land it is propelled by having a cable drum on which is coiled five-eighths of a mile of steel wire cable, which is fastened to pulleys on trees in front, the boat moving as the wire is coiled up. The boiler is hung on an axle, and can be kept level in going up or down hill. McLachlen Bros. of Eganville have secured two for immediate use, the one just described being the first to turn up here."

A submarine diver can not see anything at a depth of ninety feet and has to rely solely on the sense of touch. This fact, in addition to its being extremely difficult for him to breathe at a depth of over sixty feet, makes the work painful and awkward as well as slow.

Everybody Pleased.

On all sides are heard expressions of approval of the Nickel Plate road's new train service which went into effect on Sunday, May 28. Three fast trains are now running in each direction daily, and daily in this case means seven days a week. Superb dining cars and through sleepers to and from New York, Chicago and Boston form part of the new equipment of the Nickel Plate road.

1-8-15

An Accomplished Fact.

The new train service on the Nickel Plate road went into effect on Sunday, May 28. Three trains are now run in each direction daily, leaving Buffalo going west at 5:50 a. m., 12:05 noon, and 11:25 p. m., and leaving Chicago for the east at 7:35 a. m., 2:30 p. m. and 9:30 p. m. No change of sleeping cars between New York, Boston and Chicago in either direction. Superb dining cars are a feature of the new service.

1-8-15

MARINE VALVE OIL

For Cylinder Lubrication is unsurpassed, and is used in 90 per cent. of the large steamers on the great chain of lakes.



Marine Valve,
Renown Engine,

Eldorado Engine, Victor Signal,
Crank Case, Dark Lubricating,
Artic Cup Greases, and Lard Oils.

— CARRIED IN STOCK AT THE —

Standard Oil Company's Marine Depot,

123 River Street, CLEVELAND, O.

TELEPHONE 77. MAIN OFFICE TELEPHONE 682.

ALSO FOR SALE BY

STANDARD OIL COMPANY.

No. 5 Wabash Ave., Chicago, Ill.
Racine, Wis.
Broadway & Mason, Milwaukee, Wis.
Sheboygan, Wis.
Manitowoc, Wis.
Green Bay, Wis.
Marinette, Wis.
Oshkosh, Wis.
Duluth, Minn.

West Superior, Wis.
Hancock, Mich.
Marquette, Mich.
Sault Ste. Marie, Mich.
Michigan Central Railway & 10th St.,
West Bay City, Mich.
Eighth & Sears Sts., Saginaw, Mich.
46 Jefferson, Detroit, Mich.
Summit & Monroe Sts, Toledo, O.



ATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. MCKINNON, Ashtabula Harbor, O.
HULL & RAND, Huron, O.

STANDARD OIL COMPANY, Star Oil Works, Buffalo, N.Y.
BABY & DALE, St. Clair, Mich.
N. C. ALTEN, Lorain, O.
A. F. HARRINGTON, Conneaut Harbor, O.

A. H. MCGONAGIL, South Chicago, Ill.
MARINE SUPPLY Co., Fairport, O.
F. KRANZ, Sandusky, O.
THE M. I. WILCOX CORDAGE & SUPPLY Co., Toledo, O.

F. W. WHEELER,
President.

E. T. CARRINGTON,
Vice-President.

F. L. GILBERT,
Secretary.

F. W. WHEELER & CO.,

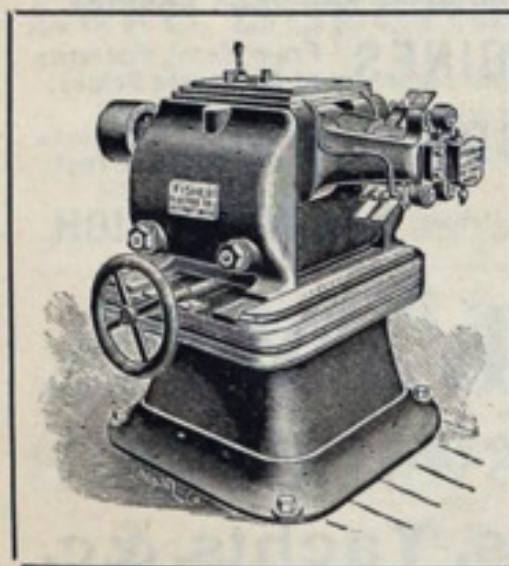
WEST BAY CITY, MICH.

Builders of all kinds of METAL AND WOODEN SHIPS.

**"PL" DIXON'S
"PL"
GRAPHITE.**

Dixon's Perfect Lubricating Graphite is indispensable to every engineer and machinist. It can be used dry or mixed with water, oil or grease. We send free of charge a sample and pamphlet with interesting and instructive information.

JOS. DIXON CRUCIBLE CO., NEW JERSEY, N. J.



Second-Hand Lighting Plants for Sale.

One 300-Light Brush Dynamo,
One 150-Light Brush Dynamo,
One 125-Light Brush Dynamo,

REMOVED FROM STEAMERS CITY OF CLEVELAND AND CITY OF DETROIT.

One 125-Light United States Dynamo, Removed from Steamer Castalia.

One 300-Light United States Dynamo, Removed from Steamer Tuscarora.

One 125-Light Thomas-Houston Dynamo, Removed from Yacht Wadena.

Fisher Electric Company,

Detroit, Mich.

"Nothing Succeeds Like Success."

The United States Metallic Packings

FOR

Piston Rods and Valve Stems.

After Years of Service it Still Excels ALL Others. In use ON MOST ALL THE LARGE STEAMERS ON THE LAKES.

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VICE-PRESIDENT.

W. I. BABCOCK,
MANAGER.

O. R. SINCLAIR,
SECRETARY.

CHICAGO SHIP BUILDING COMPANY,

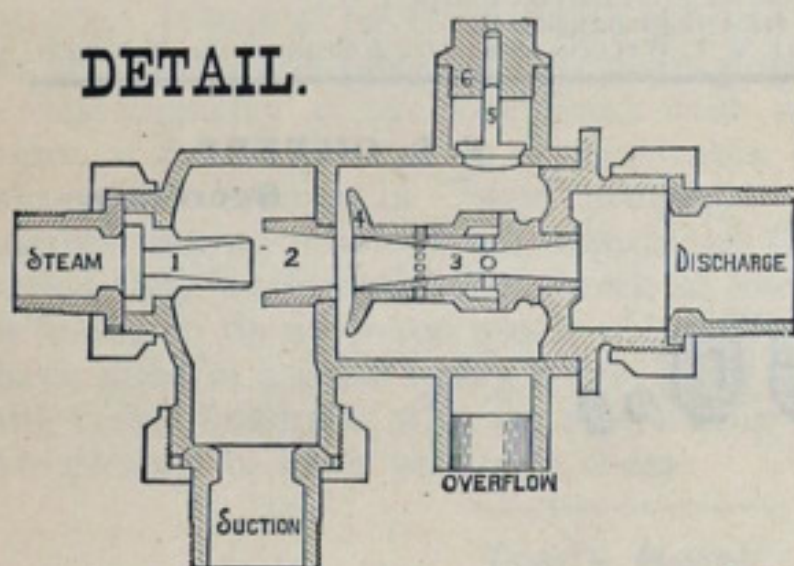
STEEL STEAM-SHIP BUILDERS,

TELEPHONE No. 40.
(South Chicago Exchange.)

101st St. and Calumet River, COLEHOUR, ILL.

The Globe Automatic Injector.

DETAIL.



See the SIMPLICITY OF IT!

SUPERIOR FOR
MARINE BOILERS.

Write for Particulars.

Eagle Lubricator Co.

MANUFACTURERS,

108 Canal St., - Cleveland, O.

A NEAT TRICK.

OWNER—Captain, do you want to see a neat trick explained?

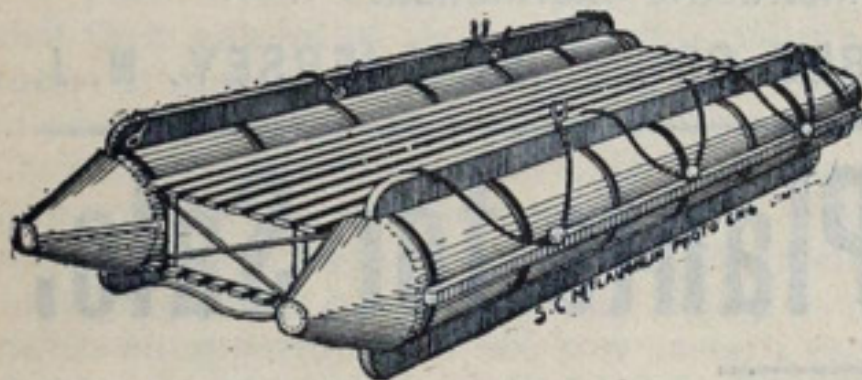
CAPTAIN—Yes sir, what is it?

OWNER—Here is a circular explaining CRAWLEY & JOHNSTON'S "Cincinnati" Automatic Steam Steerer.

CAPTAIN—(After a careful study.) That's the best and simplest I ever saw. "It's a corker." Put one of them on my boat and I'll show you some quick work and save the price of it in a few trips.

OWNER—I'll do it, and advise my friends to investigate it.—Write for prices, etc.

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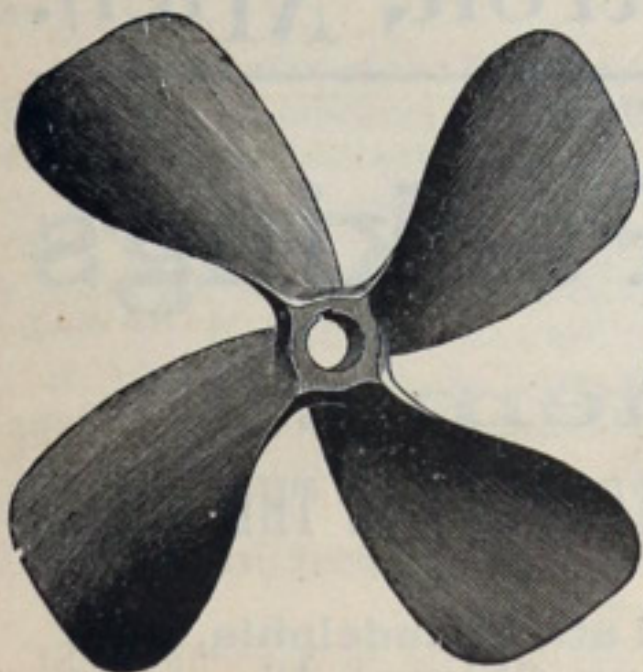
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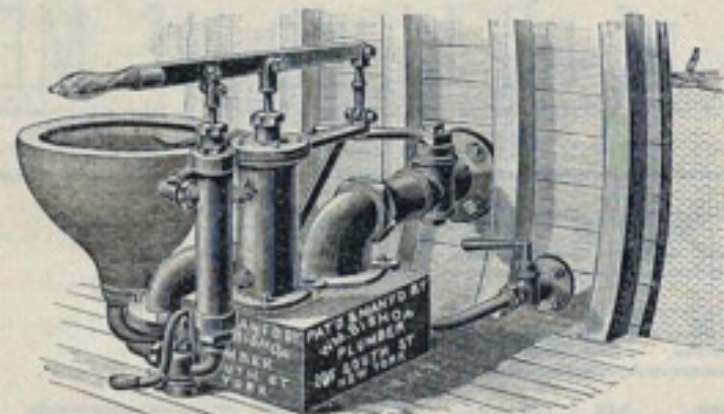
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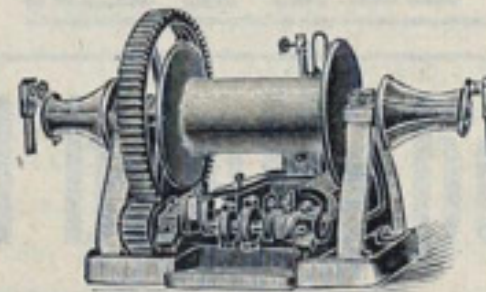
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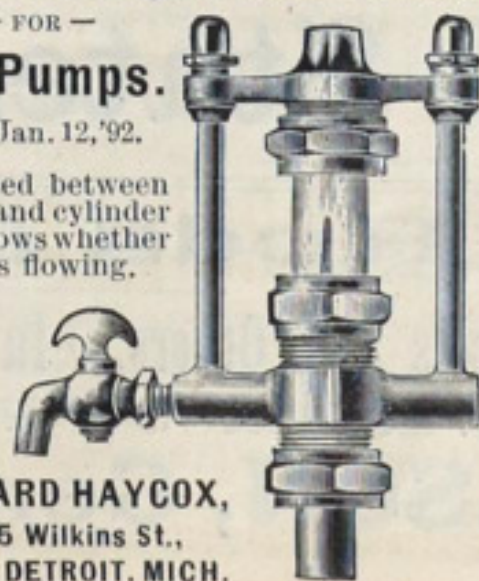
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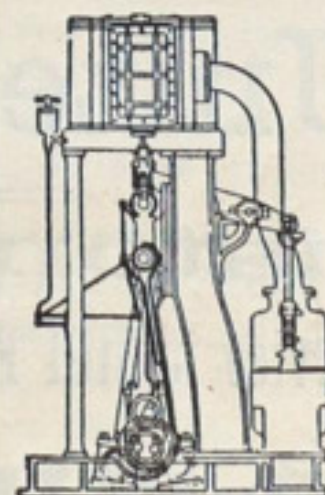
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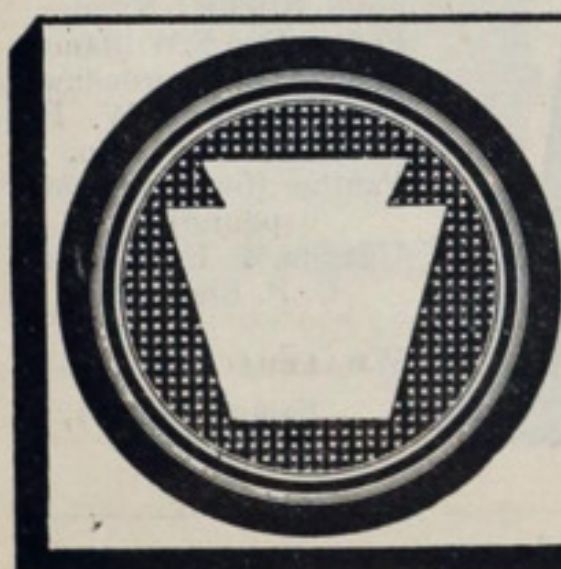
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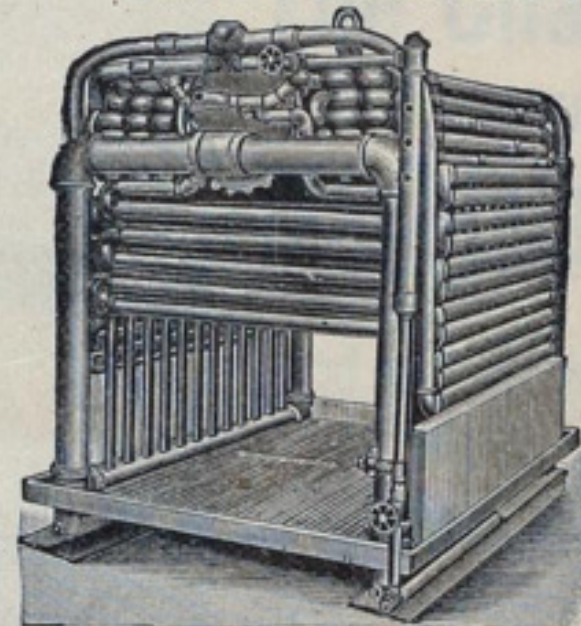
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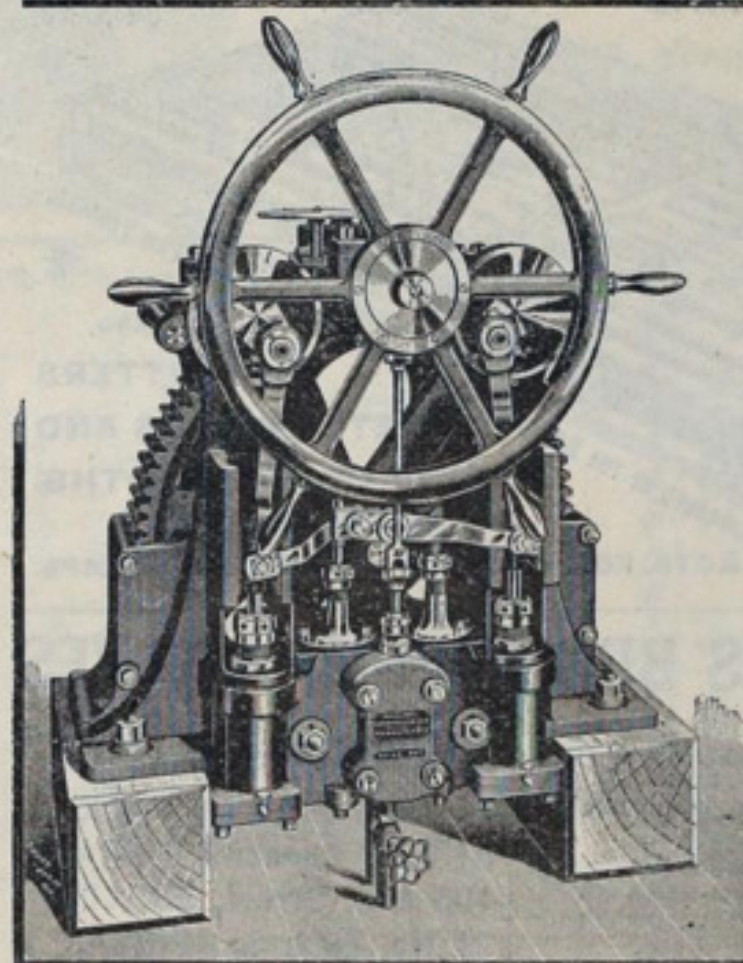
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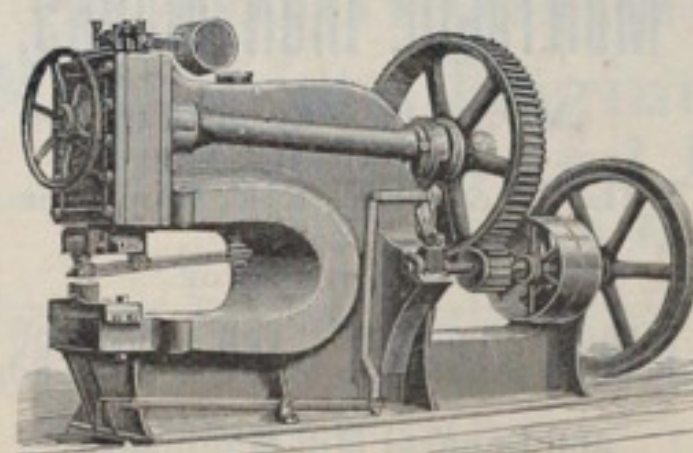
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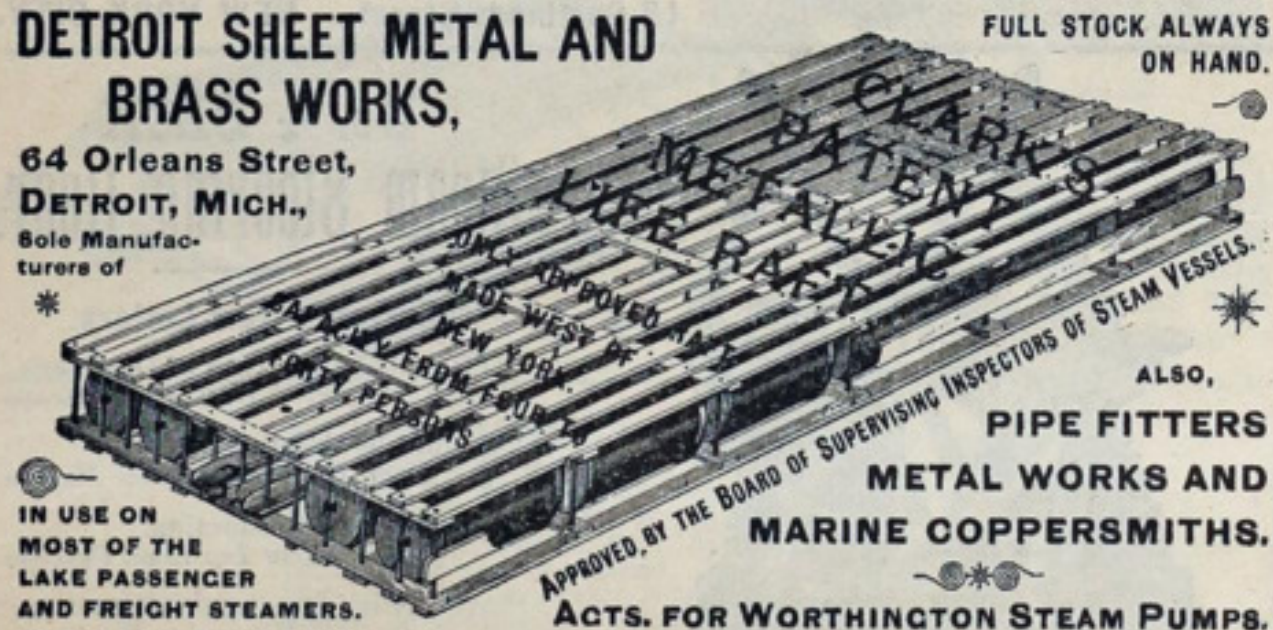
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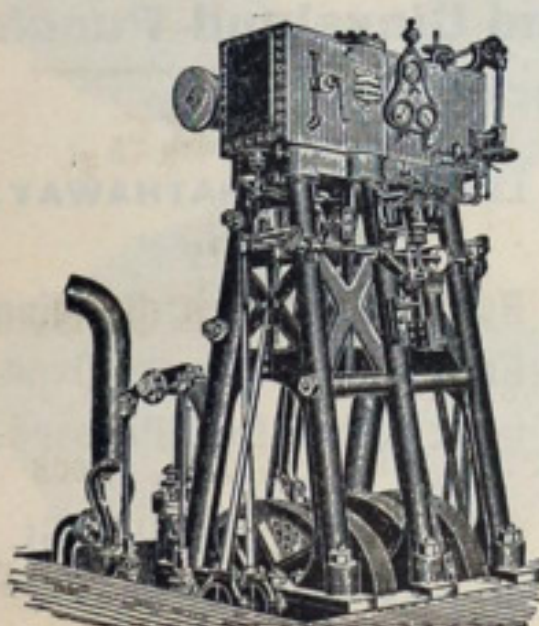


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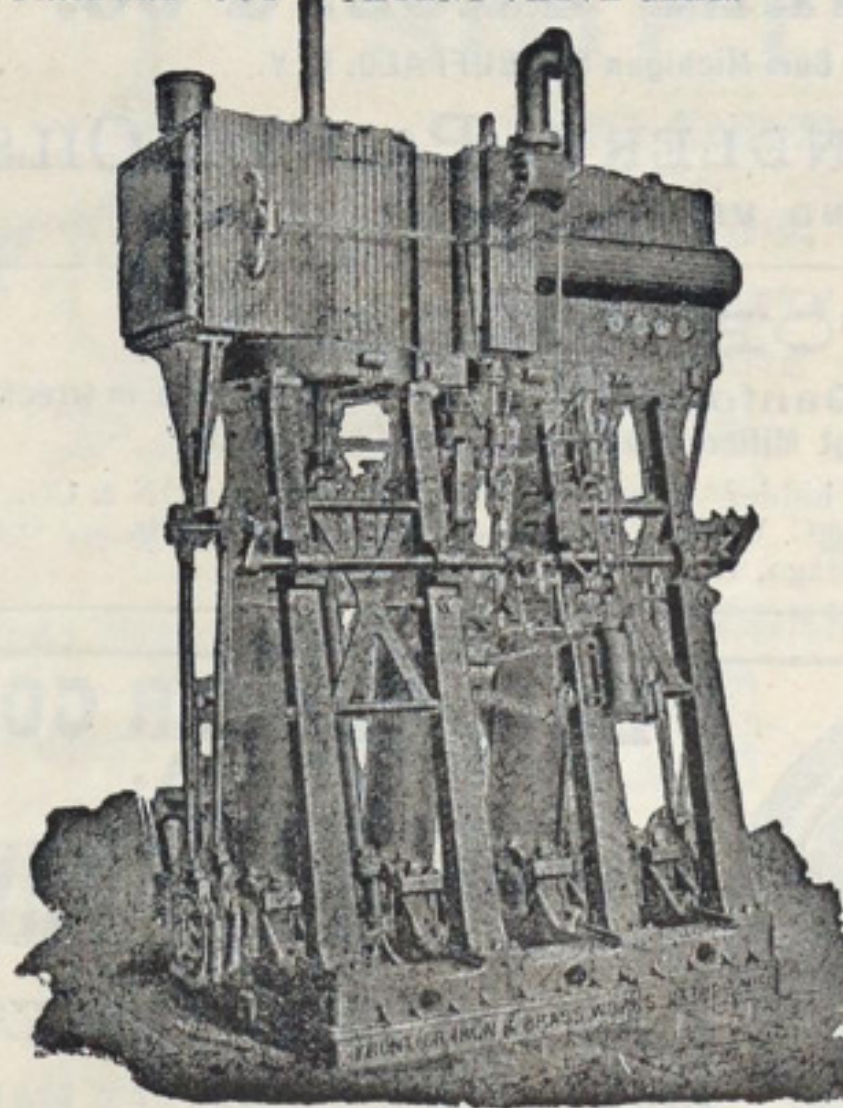
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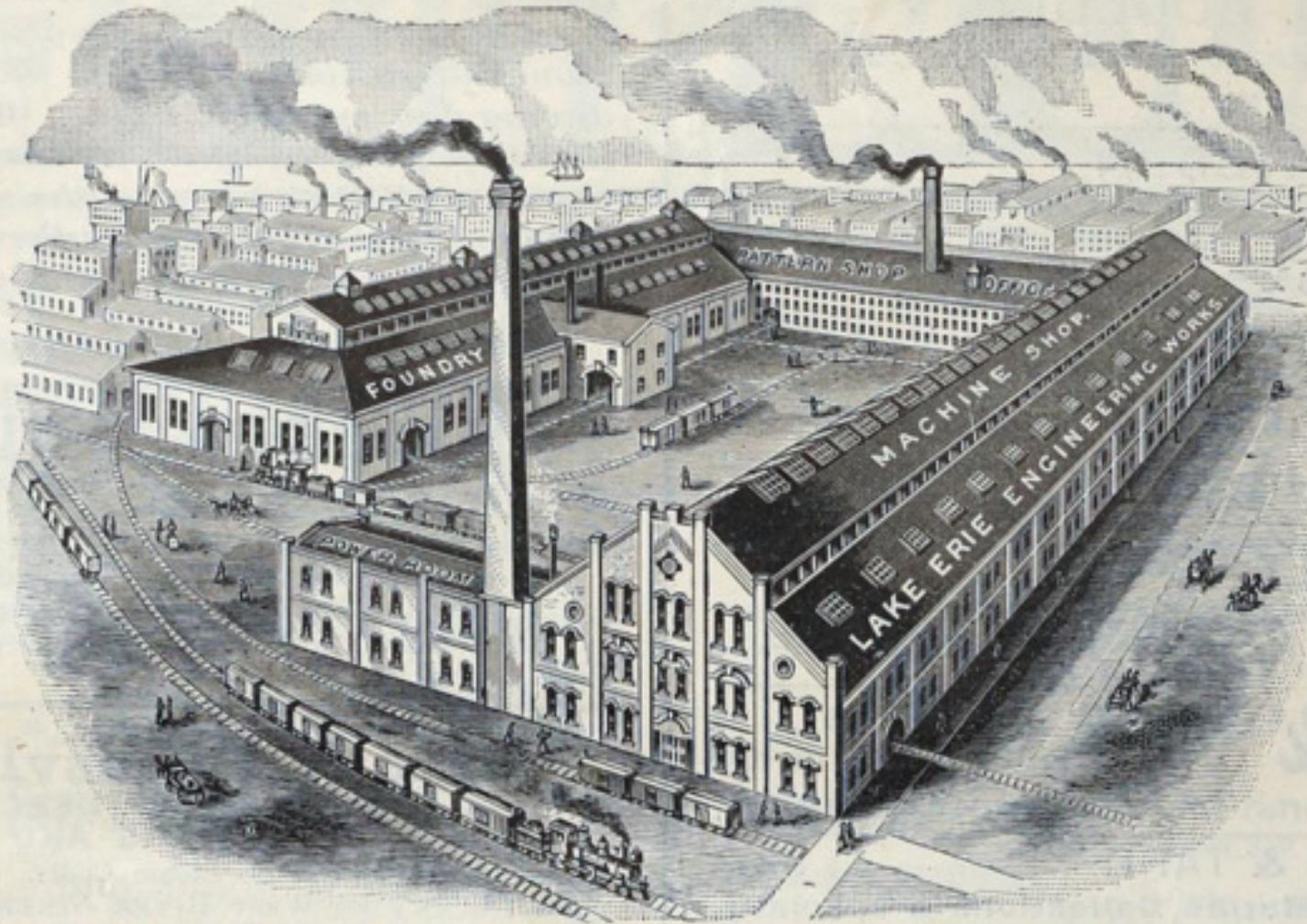
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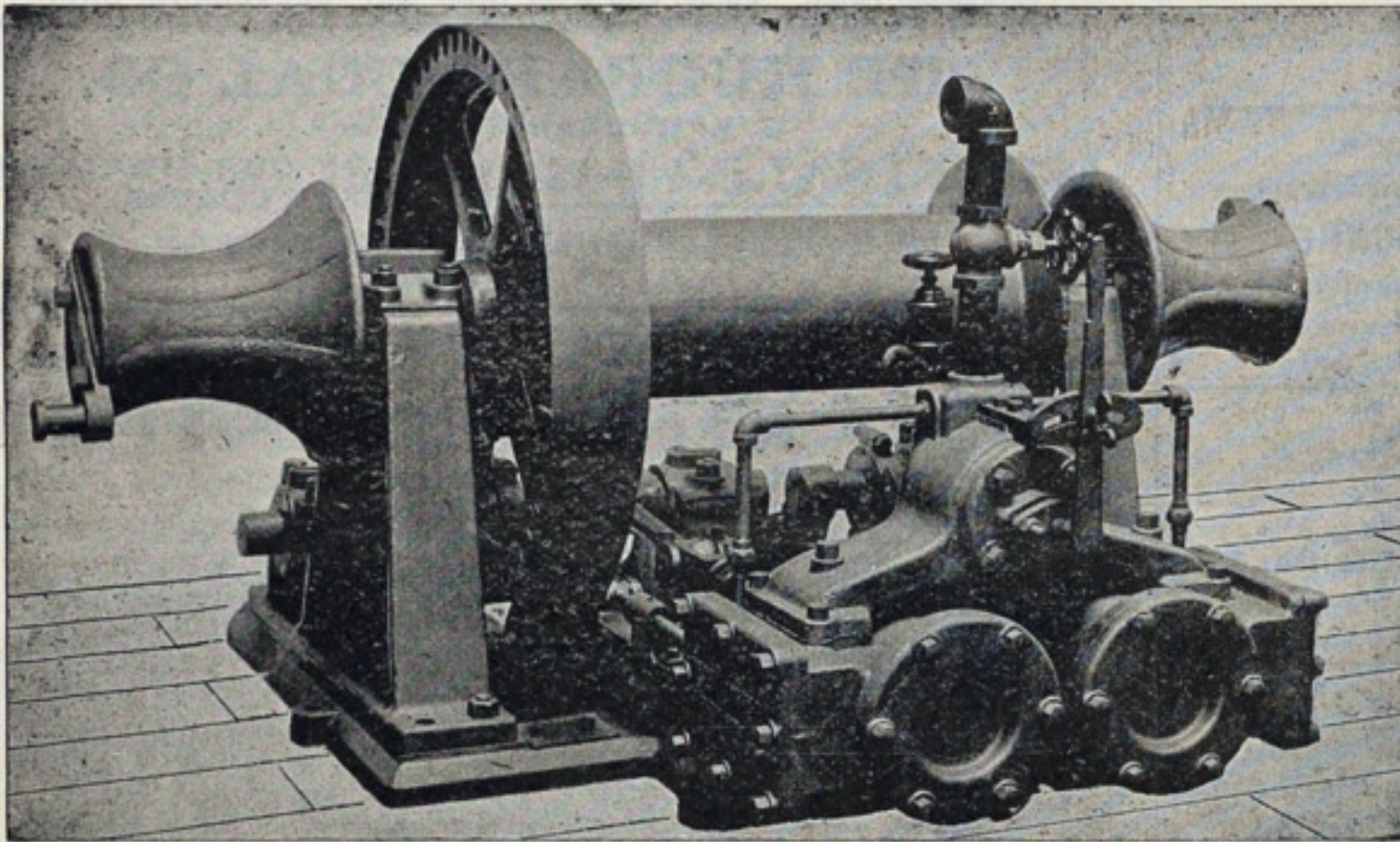
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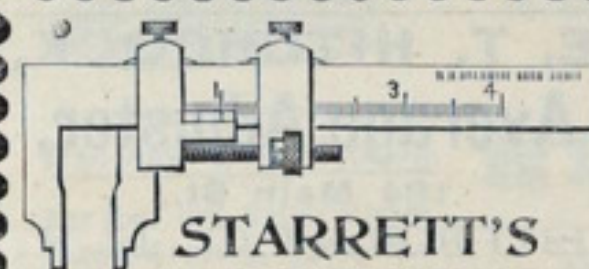
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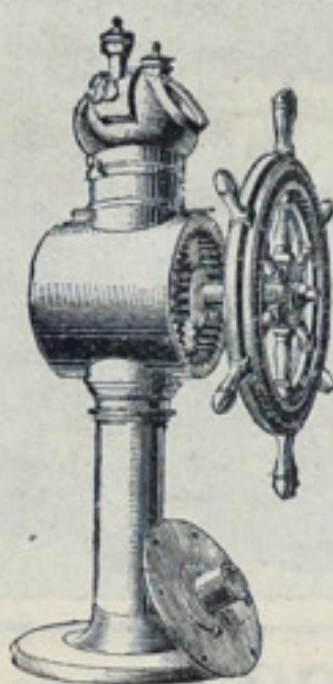
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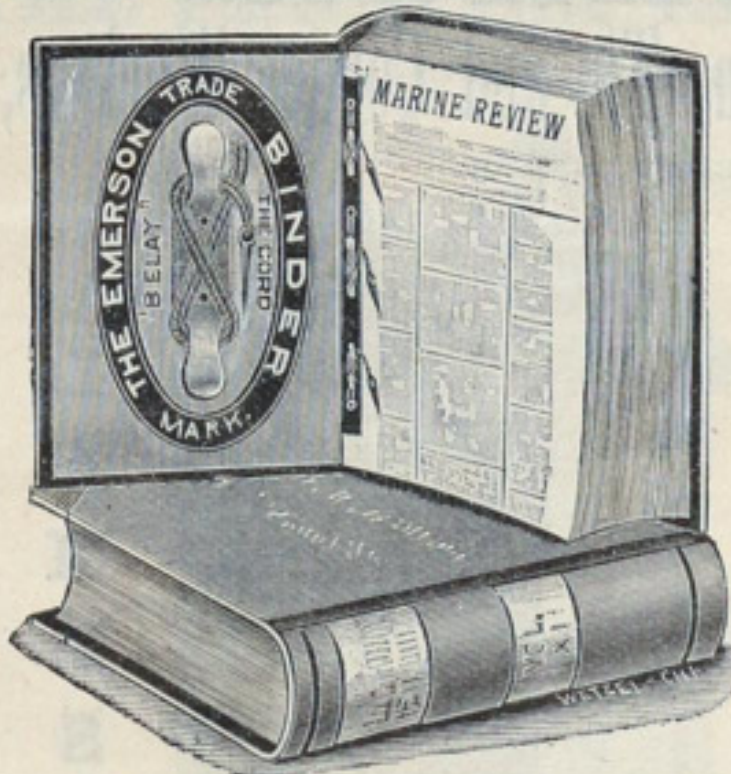
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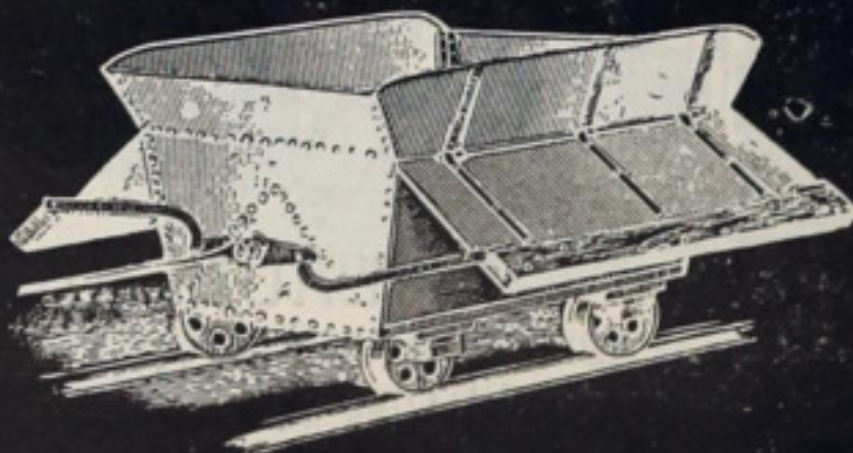
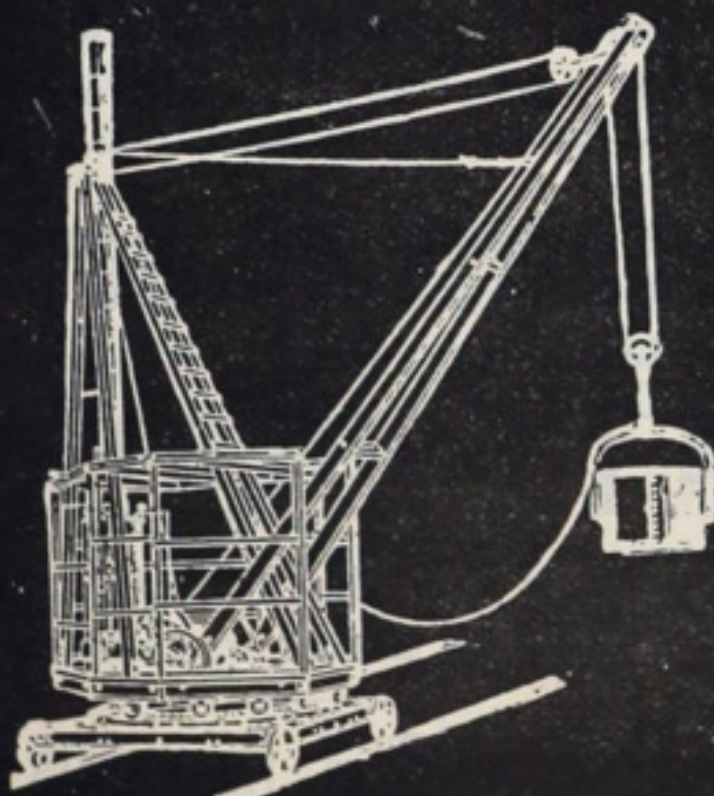
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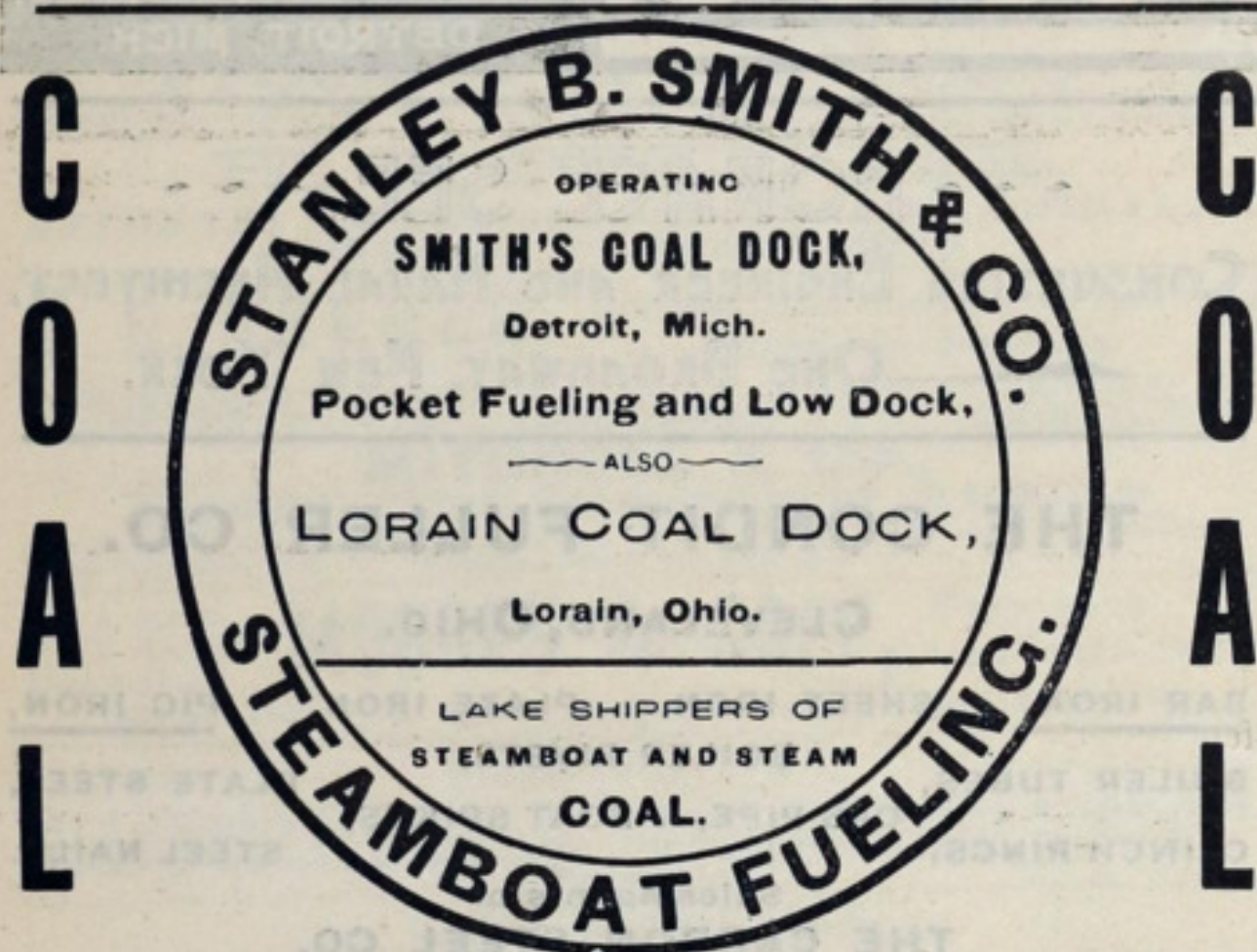
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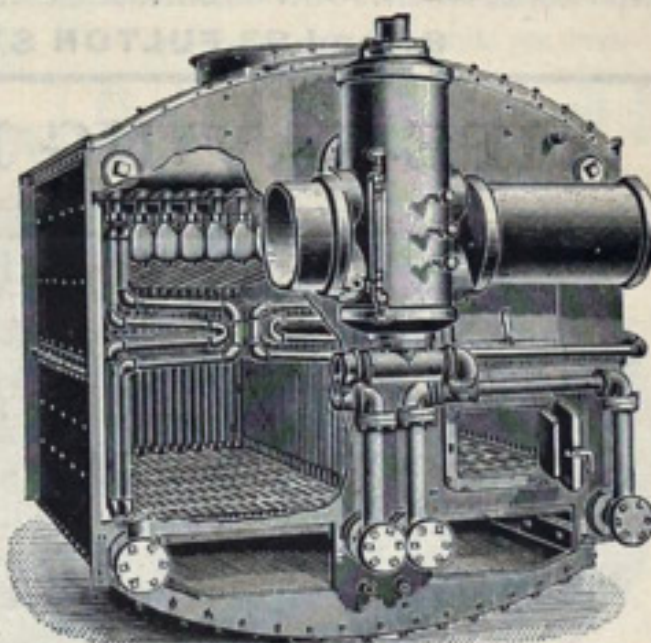
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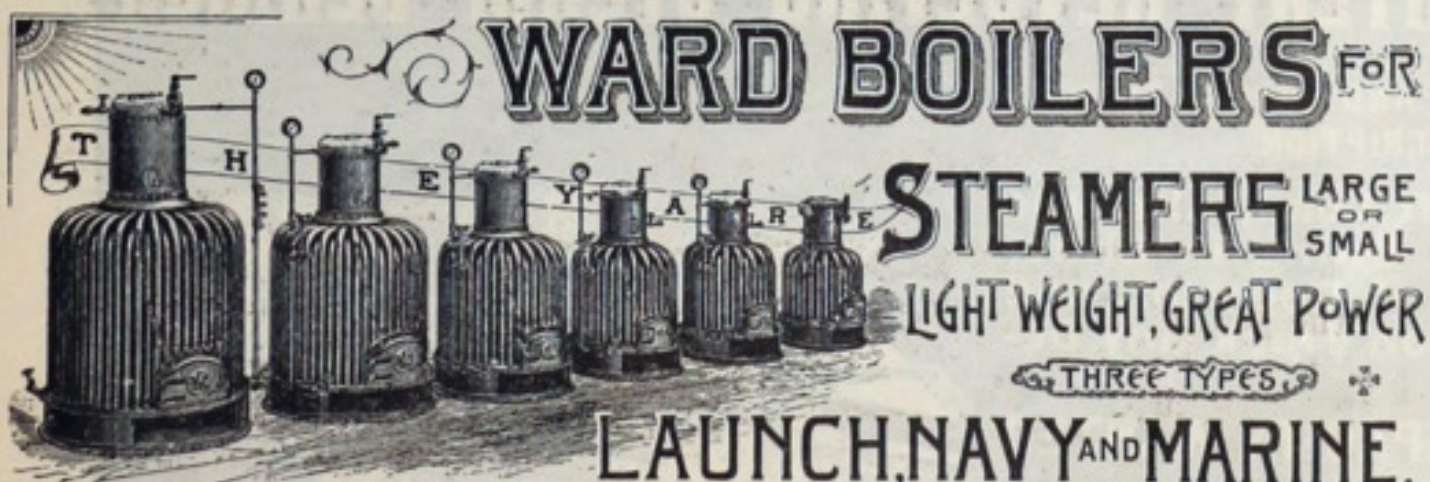
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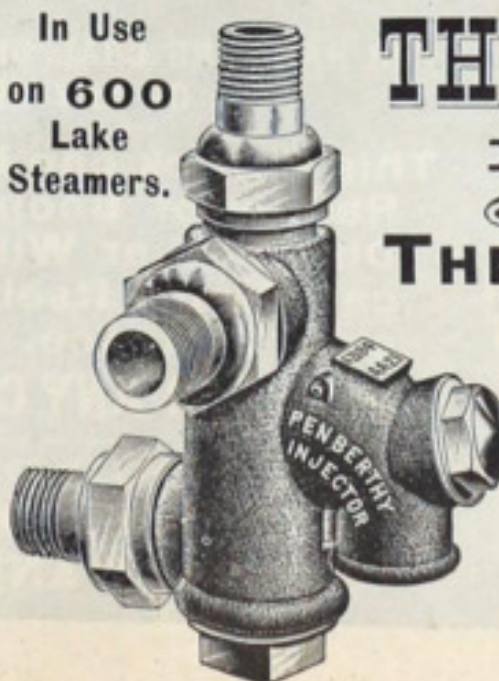
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